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ELEPHANTS

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A GUIDE TO EARTH HISTORY
MERMAIDS AND MASTODONS
EAST FROM TUNIS

ELEPHANTS

*A Short Account of their Natural History
Evolution and Influence on Mankind*

by

Richard Carrington

WITH ILLUSTRATIONS BY
MAURICE WILSON
AND OTHERS



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For

FREDERICK EVERARD ZEUNER

great teacher and true friend

There is no creature among al the Beasts
of the world which hath so great and ample
demonstration of the power and wisdom
of almighty God as the Elephant.

EDWARD TOPSELL: *The Historie of
Foure-Footed Beastes* (1607)

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Preface

IF YOU WERE TO STOP a number of people in the street and ask them the simple question, "What is an elephant?" you would be likely to get some interesting replies. Most people, after looking at you nervously and wondering if they should call a policeman, would probably snap back: "Why, an elephant's an elephant, of course! What a stupid question!" If pressed, however, they might take pity on you, and tell you that an elephant was a large grey animal, with tusks and a trunk, and that it liked buns. They might also add that, if you were as childish as you appeared to be, you could ride on its back at the Zoo and see it stand on its hind legs at the circus.

But there would be other people who might take their description rather further than this. For instance, an historian would certainly say that elephants have played an important part in the history of warfare; a hunter would add that they were among the most exciting of all animals to murder; and an artist or a poet might even say that elephants were beautiful. One of the most important answers would come from a man of science. First he would point out that the word 'elephant' includes two quite different living animals, inhabiting different continents, and varying considerably in size and appearance. If he were a field naturalist he would add that they also showed great differences in their psychology and behaviour. And if he were a palæontologist (or student of ancient forms of life), he would certainly stress one of the most interesting facts of all—that the two kinds of living elephants are the only survivors of a huge order of animals, with no fewer than 352 different branches, which during the past sixty million years has been spread over almost the whole land surface of the globe.

In this book I shall consider all these different answers, and many more besides, in an attempt to give the reader a simple but comprehensive survey of elephant science and elephant lore. The natural history of the elephant will of course play an important part in this survey, but I should be most disappointed

PREFACE

if the book were regarded simply as a compilation for naturalists. The elephant has many other claims on our attention. Apart from the roles I have mentioned above, it has played a part in the history of religion, art, mythology, literature, and even music; it produces, in the ivory of its tusks, a valuable article of commerce; and since very remote times it has ranked with the horse, the dog, and the camel as a faithful servant of man. All these aspects of elephantology will find a place in the following pages.

The book is divided into three parts. The first, which I have called "Elephants as Animals", is mainly devoted to the zoology of elephants, and the behaviour of elephants in the wild. The second, called "Elephants as Fossils", deals with the origin of elephants, some exceptionally interesting fossil species of elephants from past ages, and the importance of elephants and their relations in helping us understand the evolutionary process. The third part, called "Elephants and Man", discusses the many different roles played by elephants in the history of man himself—especially in his religion, his art and his social and economic life.

So far as possible I have used non-technical language, and where I have not been able to avoid introducing an unfamiliar scientific term I have always made a point of explaining its meaning. Some of the chapters in Part 3 are to a certain extent independent, and the reader can please himself in which order he reads them. But if his knowledge of elephants is only slight I think he would be well advised to read the chapters of Parts 1 and 2 in the order in which they appear.

The book is primarily meant to be read for enjoyment, but I have not therefore thought it justifiable to shirk the responsibility of exact documentation. The sources of my facts are listed in the Bibliography on pages 253-67, and a page reference is given for all the more important quotations. To achieve this degree of exactness without cluttering up the pages with distracting footnotes has not been easy, and a word must be said about the plan adopted. Quotations, and many other statements requiring authoritative support, are numbered consecutively in square brackets throughout the text, the numbers referring to the key on pages 251-2. This key follows the standard international

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practice of simply giving the author's name, the date of the relevant publication, and the number of the page on which the statement appears; the full name of the work can then be found by reference to the Bibliography. I have reduced footnotes in the body of the work to a minimum, but where amplification seemed absolutely necessary a footnote is indicated by an asterisk or dagger in the usual way. I hope by following this plan I have enabled the layman to read the book right through without distraction, while at the same time giving the specialist full bibliographical information for further research.

Another point I would like to cover here concerns the quotations which, especially in Part 3, are numerous and sometimes quite long. Most of these are from old books, and I have preferred to give them in the original rather than to paraphrase their contents for two main reasons. Firstly, I felt that in considering elephants, and particularly elephants in relation to man, it is interesting to hear what different men and women have said about the animals in their own words; the emotional reaction of the individual writer, as revealed in his style, seemed to me as much a part of the story as the facts he wished to convey. Secondly, nearly all the books quoted are out of print, and I felt it would be of value to readers who live out of reach of the British Museum Reading Room, and the various specialist libraries where the works can be consulted, to have a number of exceptionally interesting or graphic passages reproduced verbatim from the original text. Except the two translations from Rooke's *Arrian* in Chapter Twelve, where archaisms tended to obscure the sense, I have retained even those minor eccentricities of spelling, punctuation, and grammar which some transcribers might have taken it upon themselves to "improve". My reason for doing so was not, I hope, an excess of pedantry, but a conviction that the human interest of the book would thereby be enhanced.

My debt to the authors of the many books and papers listed in the Bibliography will be apparent to all who know their works, and it is a pleasure to be able to acknowledge it. In addition, my warmest thanks are due to the many authorities who have read the whole or part of the manuscript and given me the benefit of their personal advice and criticisms. These

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are: Professor F. E. Zeuner of the Institute of Archæology, University of London, to whom the book is dedicated; Professor D. M. S. Watson of University College, London, who gave me the benefit of his vast experience in preparing the chapters on "Elephants as Fossils"; Dr. L. Harrison Matthews, F.R.S., Scientific Director of the Zoological Society of London; Captain C. R. S. Pitman, formerly Game Warden, Uganda Protectorate; Captain Keith Caldwell, Honorary Game Warden, Kenya Colony; and Lieut.-Colonel J. H. Williams ("Elephant Bill"), whose astringent but kindly criticisms have, I hope, enabled me to make several improvements in the first two chapters of Part 3. I have attempted to make the book live up to the high standards set by all these authorities; where it falls short of them I only am at fault.

Once again I have had the great pleasure of working with Mr. Maurice Wilson, whose graphic reconstructions of fossil elephants will, I am sure, be of great assistance to the reader in bringing these animals of the past imaginatively to life. For the remaining illustrations, apart from those photographed by me or under my direction, acknowledgements are due to the following sources: Satour (Frontispiece and Plates 1*a*, 3*b*, 22); Black Star (Plates 2, 11*a*, 15*a*, 15*b*); East African Railways and Harbours (Plate 3*a*); East Africa Office (Plate 4); Paul Popper (Plates 6*a*, 6*b*, 16*b*); American Museum of Natural History (Plates 8*b*, 10*a*, 10*b*); United Nations Organization (Plate 12*a*); Associated Press (Plate 13*a*); Government of India (Plate 13*b*); Hulton Picture Library (Plate 17*a*); Comet, Zürich (Plate 19*b*); Kemsley Picture Service (Plate 20). I also owe a great debt of gratitude to my publishers, Messrs. Chatto and Windus, Ltd., who, by allowing such a lavish scale of illustration, have immeasurably enhanced any value the text may possess. My particular thanks go to my friend Peter Calvocoressi, who has encouraged me in many difficulties, and seen the book through all stages of its production.

The last, but by no means the least, of my tributes goes to the great order of mammals which are here described. Every aspect of the natural world, whether it be animals and plants, or the rocks of the Earth's crust, or the sky above the Earth, is provocative of wonder and demands our reverence. But there will

PREFACE

always be a special place in my own heart for the elephants, whether one regards them simply as a noble product of the evolutionary process or, in Topsell's phrase, as "a great and ample demonstration of the wisdom of almighty God". The time is now in any case approaching when even scientists may allow us to regard these two definitions as the same.

R. C.

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PART I

Elephants
as
Animals



CHAPTER ONE

The Kinds of Living Elephants

IN THE YEARS 1936 and 1942 the late Professor Henry Fairfield Osborn of Columbia University, U.S.A., published two gigantic volumes devoted to the extinct and living elephants of the world, their relations and their ancestors. The preparation of this monograph occupied twenty-five years of Osborn's life, and in its final form it comprised over 1,600 pages. It contains a classification and description of more than 300 different elephants and elephant relations. All but two of these are now extinct.

Osborn entitled his monograph *Proboscidea*, the name of the natural group, or order, of animals to which all the elephants of the world belong. The name Proboscidea is derived from the proboscis, or trunk, which is the elephants' main distinguishing feature, and the group's 352 members are themselves subdivided into smaller units with certain physical affinities. To understand the principles of this classification, and thus to see the place of the two kinds of living elephants in the history of the group, we must first make a brief excursion into the realms of zoological nomenclature.

As long as man's knowledge is bounded by his immediate environment, the classification of the objects of his experience is scarcely necessary. But as his awareness grows it becomes increasingly important for him to devise a system of pigeon-holes in which he can file the facts presented to him and make them more manageable. This is particularly true in the world of natural history, for there is obviously a wide variety of life forms which nevertheless seem in some way related. Thus the three animals "dog", "wolf", and "fox", although differing in many points of detail, have obvious family resemblances, as do,

say, such birds as jays and magpies, or the various kinds of fish that men pull up from the sea.

The ancient Greeks, especially Aristotle, had already recognized the need for producing some method of labelling the different animals according to their family resemblances, but the simple system they devised did not prove adequate to deal with the vast mass of knowledge that accumulated in succeeding centuries. In western Europe, during the Middle Ages and Renaissance, the classification of natural objects was reduced to something very like chaos. At length, in the first half of the eighteenth century, the great Swedish botanist and zoologist Carl Linnæus produced a new and comprehensive system, which he published in 1735 as the *Systema Naturæ* or *System of Nature*. This proved almost entirely successful, and although it has been modified in detail, the general principles of classification propounded by Linnæus are still followed today.

The modern system of naming the animals, based on the work of Linnæus, is briefly as follows. The whole of the living world is divided into two great kingdoms, the animal and the vegetable. These constitute the twin trunk of the tree of life, from which radiate first the main branches, or "phyla"; then the smaller branches, or "classes"; and then the subdivisions of these, known as "orders", "families", and "genera". Finally, composing the outermost twigs, come the "species", the "subspecies", and, last of all, the geographical "races", or "varieties".

During the late eighteenth and early nineteenth centuries naturalists were busy trying to fit the two living species of elephants comfortably into the Linnæan scheme. Linnæus himself placed them in a natural division which he called the Bruta, with the sea-cows, sloths, anteaters and pangolins. This ill-assorted collection causes us to suspect that Linnæus created the Bruta as a kind of oddment box to take those awkward creatures that would not fit in anywhere else. Whether this is true or not, the classification was soon seen to be unsatisfactory, and was replaced by that of the German anthropologist and physiologist, Professor Johann Blumenbach. According to this scheme the elephants were pigeon-holed first with, of all unlikely animals, the walruses, and then with the tapirs, rhinoceroses,

THE KINDS OF LIVING ELEPHANTS

and hippopotamuses. Later the pigs were added to the group, which received from the two French naturalists Cuvier and Geoffroy-Saint-Hilaire the name of Pachydermata, or "thick skins". This classification was also eventually abandoned, but the elephant, rhinoceros, and hippopotamus have been popularly referred to as pachyderms ever since—an odd instance of the survival of a purely technical word.

Modern classification of the elephants is largely based on the scheme devised by Osborn in the great monograph mentioned above. But here again there were difficulties. Osborn was nothing if not an individualist, and when his researches revealed the vast numbers and variety of extinct elephants he was moved to create a whole new system of classification of his own. This was known as the Osbornian classification, and it comprised a bewildering number of natural groups which were not strictly in accordance with the principles of classification generally accepted for other kinds of animals. After Osborn's death, therefore, naturalists were in a dilemma. They either had to modify his classification to conform with traditional principles, or reclassify the whole animal kingdom according to the Osbornian scheme. (A third possibility, that the elephants should be left with a unique system of classification of their own, was ruled out by universal consent.) Complete reclassification was obviously impossible, so the modern family tree of the elephants represents a compromise between the Osbornian and the traditional views.

To conclude this excursion into taxonomy, as specialists call the principles of classification, a word must be said about the Latin and Greek names by which animals are scientifically distinguished. Laymen are apt to take fright at these, but they are really a simplification. The names are based on the genus and species of the particular animal under discussion, and are of great value in identifying it beyond any shadow of doubt. For example, in the scientific name of the African elephant, which is *Loxodonta africana*, the first name shows that the animal belongs to the genus *Loxodonta*, or "slanting-toothed ones", and the second that it belongs to the particular species *africana* within that genus. In fact, the two names correspond respectively to the surname and Christian name of a human being as

ELEPHANTS AS ANIMALS

written in a telephone directory or similar register. To take an example, the name *Loxodonta africana* corresponds quite simply with the name "Brown, John", while the name of its extinct relation, *Loxodonta antiqua*, corresponds with that of John's dead uncle, "Brown, Harry". The two names together are known as the "specific name" of the animal, and it is easy to see how convenient this is in providing a simple but precise label.

The extinct members of the order Proboscidea will be considered more fully in the second part of this book, where we shall also have something further to say about the way the elephants are classified. But in order to bring the whole subject imaginatively to life we must first look rather more closely at the two living species. These come respectively from Africa and Asia, and were formerly regarded as being members of the same genus, with the names *Elephas africanus* and *Elephas maximus*. But the very great differences between them at length caused them to be separated, and the African elephant was removed from the genus *Elephas* and placed with a number of extinct forms in the genus *Loxodonta*.

There are several important internal differences between the two species which will be described later, but even to an outward view they are easily distinguishable. The African elephant is the larger of the two, a good bull standing 11 feet, or even more, at the shoulder and carrying tusks between 6 and 8 feet long. The record confirmed height is 11 feet 6 inches at the shoulder, measured in a straight line, although unconfirmed measurements up to 12 feet 2 inches have been recorded. The largest known tusk measures 11 feet 5½ inches along the outside curve, and weighs 293 lbs. The Asiatic, or Indian, elephant, as it is commonly called, seldom stands more than 10 feet at the shoulder and its tusks average between 4 and 5 feet in length. Whereas the female of the African species carries quite long, if slender, tusks, the Indian female is either tuskless or has very small tusks, known as "tushes", which often do not project beyond the jaw. A large African bull may weigh over seven tons, an Indian bull about six tons; the females of both species weigh between one and two tons less than the males.

The silhouette of the two species, looked at from the side, is very different. The back of the African elephant shows a marked

THE KINDS OF LIVING ELEPHANTS

dip between the fore and hind quarters, whereas that of the Indian forms an unbroken convex curve. The African has a comparatively elongated face with a flat forehead, and carries its head high; the Indian has a more "bull-dogged" face, with a twin-domed forehead, and carries its head low. The ears are most distinctive, being so large in the African species that they cover the whole of the neck and shoulders and reach as low as the breast; the ears of the Indian species are comparatively small. The African's trunk is marked by repeated horizontal ridges, like a telescope with very narrow sections, and ends in two fleshy processes or "fingers"; the Indian's trunk is smooth, and has only one such process. There are other less obvious



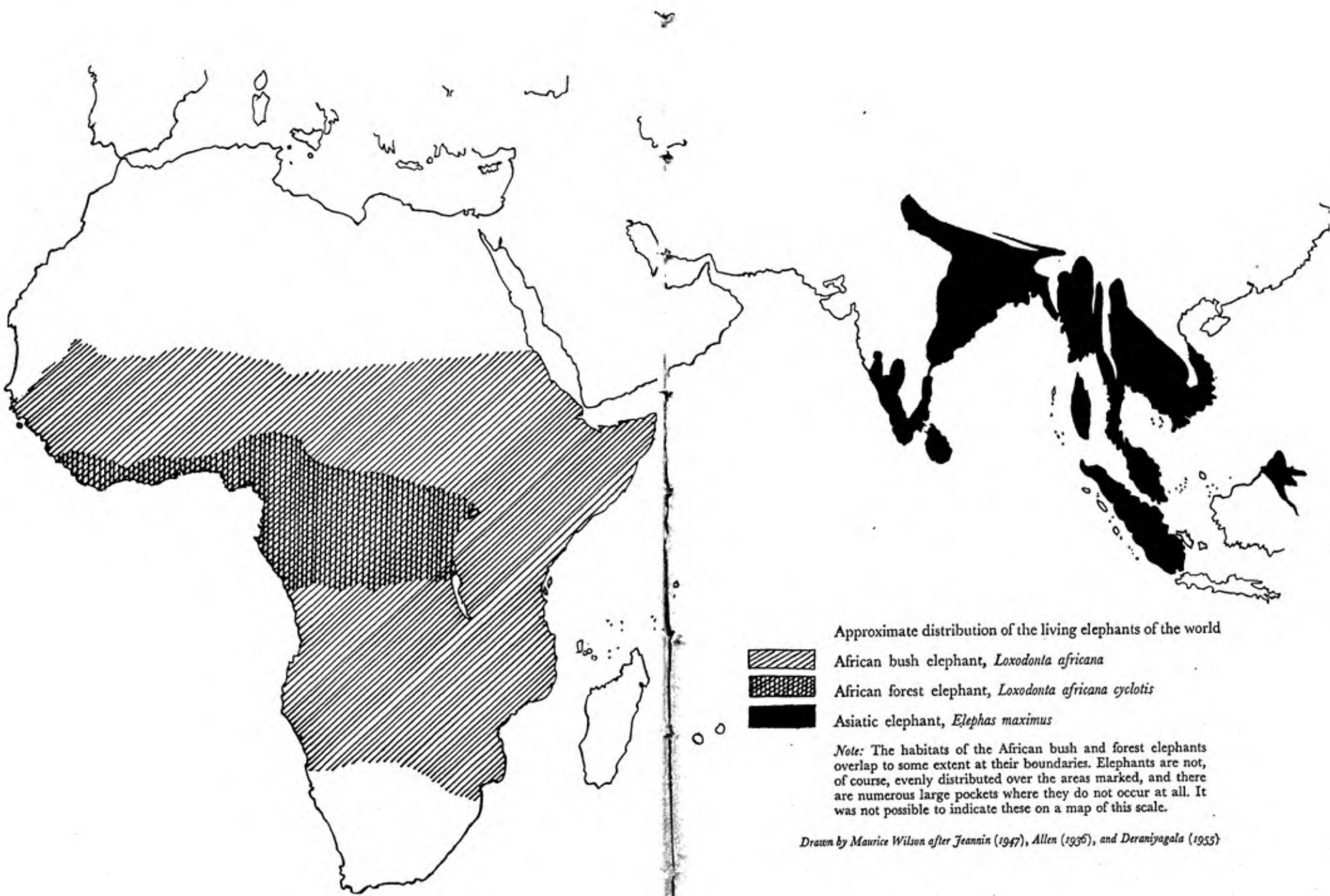
M.Wilson

Trunk tips of African (left) and Asiatic elephants compared

external differences, but those mentioned will be amply sufficient to distinguish the two animals.

Formerly there were representatives of the Proboscidea in every continent of the world except Australia and Antarctica, but the range of the two living species is much reduced. Some of the factors that may have led to this decline will be discussed later on, but meanwhile we must sadly accept the fact that the elephants are a dying race. The reader will be able to see from the accompanying distribution map roughly how matters now stand. I say "roughly", for in many areas marked as inhabited by elephants they are now rare, and numerous pockets occur where the spread of civilization has driven them out altogether. It will be seen from the maps that whereas the range of the African elephant extends over most of the African continent south of the Sahara, Asiatic elephants occur only in India, Pakistan, Ceylon, Burma, Indo-China, Malaya, Sumatra, and Borneo.

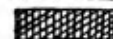
So far I have spoken of the two kinds of living elephants as if



Approximate distribution of the living elephants of the world



African bush elephant, *Loxodonta africana*



African forest elephant, *Loxodonta africana cyclotis*



Asiatic elephant, *Elephas maximus*

Note: The habitats of the African bush and forest elephants overlap to some extent at their boundaries. Elephants are not, of course, evenly distributed over the areas marked, and there are numerous large pockets where they do not occur at all. It was not possible to indicate these on a map of this scale.

Drawn by Maurice Wilson after Jeannin (1947), Allen (1936), and Deraniyagala (1955)

ELEPHANTS AS ANIMALS

the members of each group were identical all over their areas of distribution. But in reality the position is more complicated, for each of the two species shows local variations in structure and habits in different regions, and these are sometimes accompanied by important differences in external appearance. If the variations are very marked, scientists regard the animals as a distinct subdivision of the species, and a third name is added to the specific name to distinguish it. As no account of the living elephants would be complete without mentioning at least some of these subspecies, as they are called, I will briefly describe a few of those to be found in each of the two continents concerned.

To begin with the African elephant, Osborn lists no fewer than eighteen subspecies distinguished partly by size, partly by geographical distribution, and partly by the shape of the ears. He is cautious enough not to say that he regards all these subspecies as valid, being doubtless aware that scientists are sometimes apt to run away with themselves over this sort of thing. For instance, there is the case of the eminent British naturalist Richard Lydekker, who in 1907 carefully listed no fewer than twelve subspecies of the African elephant on the basis of their ear characters alone; this was a very rash thing to do, and it now seems certain that many of his distinctions were based on the vagaries of taxidermists and quite fortuitous differences between individual animals. Scientists have not yet agreed on how many of the more doubtful subspecies should be recognized, but most of them are prepared to accept at least two. These are the typical bush elephant (*Loxodonta africana*) of the eastern and southern plains which has already been described, and the considerably smaller animal found in the western rain forests (*Loxodonta africana cyclotis*).

The habitat of this smaller subspecies led Cuthbert Christy to suggest in his book *Big Game and Pygmies*, published in 1924, that it should be called the forest elephant, a name that has since been widely adopted.[1] An average forest elephant bull has a height of between 7 and 8 feet at the shoulder, compared with between 10 and 11 feet for the bush elephant, so the difference in size is considerable. The forest elephant also has more hair (especially on the chin, trunk and tail), a darker skin, and a pro-

THE KINDS OF LIVING ELEPHANTS

portionately smaller ear, which is more generally rounded in shape than that of the bush elephant. There are certain technical differences in the proportions of the skull, and the tusks are relatively small and slender. An important difference in the carriage of the head was mentioned by Christy. He pointed out that whereas the bush elephant carries the head high with the tusks more or less horizontal, the forest elephant carries it low, with the tusks close to the knees in a near-vertical position. This distinctive carriage, which is not unlike that of the Indian elephant, is probably due to the forest environment, the head and base of the trunk being used to force a path through the undergrowth, while the tusks are kept well down so as to be out of the way. Another important difference between the two animals is in the toenails, the forest elephant having five nails on the fore-foot and four on the hind, the bush elephant four on the fore-foot and three on the hind.

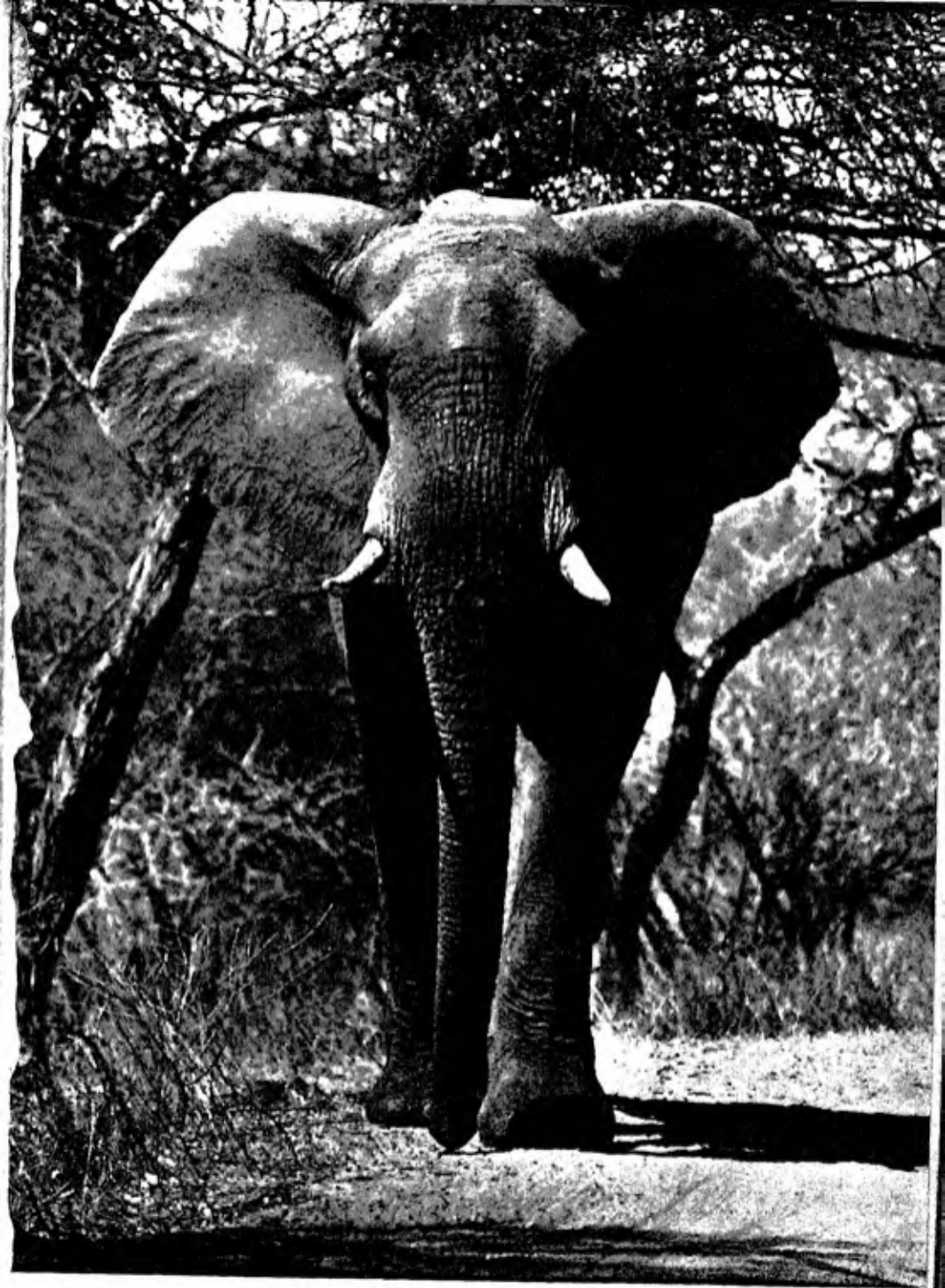
In addition to the forest elephant there have been persistent reports of a race of even smaller elephants inhabiting the African equatorial forests. The first detailed reference to these in scientific literature occurs in a paper by Professor Noack of Brunswick, published in 1906. Noack wrote that in the summer of the preceding year Carl Hagenbeck, the famous animal collector, "received a small elephant from the French Congo which differs . . . from all living elephants in that it represents a dwarf form". The animal, which was reputed to be about six years old, stood $47\frac{1}{2}$ inches high at the shoulder, which was about the same height as specimens of the forest elephant aged only eighteen months. Noack proposed distinguishing this elephant from the other types by adding the word *pumilio*, or "pigmy", to the specific name, and listed a number of differences which, quite apart from size, indicated its right to subspecific rank. But unfortunately the animal itself decided to confound the pundits. It was sold to the New York Zoological Society, in whose Zoo it grew within a few years to a height of 6 feet 4 inches, before dying of an incurable leg disease. William T. Hornaday, the Zoo's Director, continued to be convinced of the animal's pigmy status, but it now seems likely that it was simply a specimen of the forest elephant, which had perhaps been somewhat stunted in growth by the disease that caused its death.

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Later reports of pigmy elephants have appeared at first sight to be more convincing. But on examination they prove to have been based either on immature animals or on unusually small specimens of the ordinary forest elephant. There is also much confusion in terminology, for several writers refer to the forest elephant itself as the pigmy merely because it is smaller than *Loxodonta africana*. Thus, although it is possible, and indeed likely, that there may be a geographical race of the forest elephant somewhat below average size, there are as yet no grounds for recognizing a true pigmy elephant with subspecific rank.

Turning to the Indian species we find that scientists have been in even greater disagreement over the classification of the different types. It would be tedious to record all the confusions and misunderstandings that have arisen among the various authorities, which only demonstrate that even the most eminent men can sometimes be as foolish as the rest of us. Instead, I will give a brief list of the main types of Indian elephant which are commonly recognized.

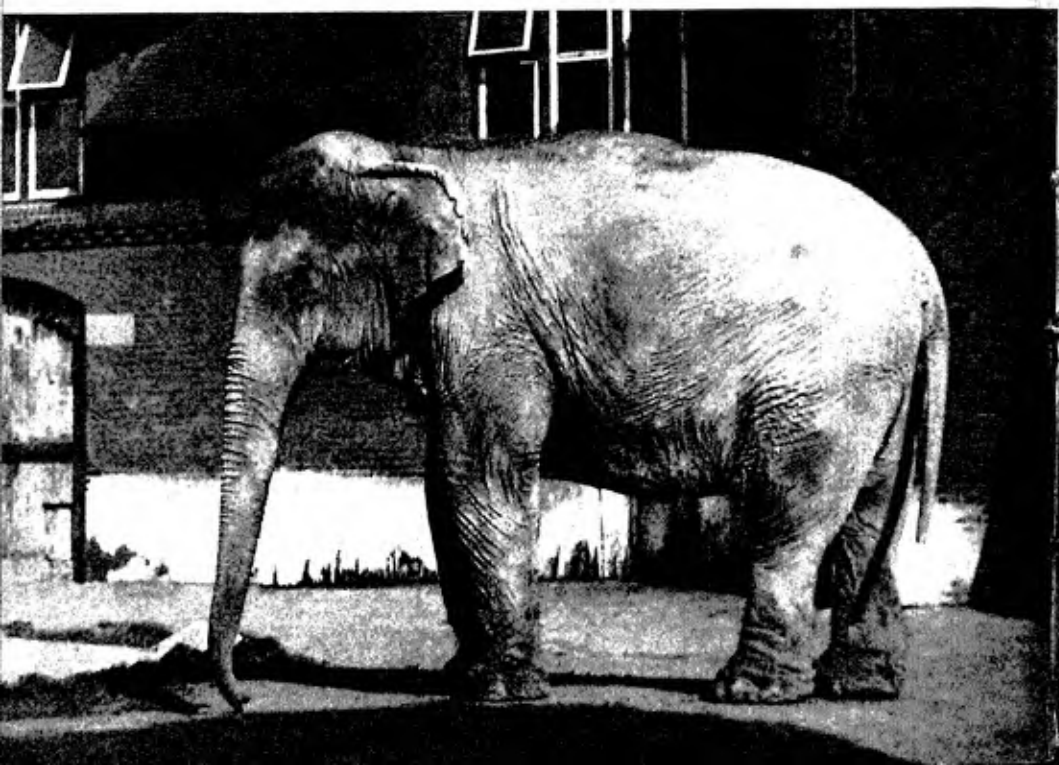
Confusingly, the typical "Indian" elephant is now regarded as being the subspecies found in Ceylon, which has been given the scientific name of *Elephas maximus ceylonicus*. This animal follows the general description given earlier when comparing the African and Indian species; also, like all Asiatic elephants, it has five nails on the fore feet and four on the hind, thus resembling in this respect the forest elephant of Africa. The typical subspecies of the mainland is *Elephas maximus bengalensis*, which has a larger head and thicker tusks than the Ceylon elephant, and according to Osborn is of "a more daring disposition". A third subspecies, *Elephas maximus sumatranus*, comes from the island of Sumatra, and a fourth, *Elephas maximus hirsutus*, from Malaya. The Sumatran elephant has evolved in isolation on its island home for perhaps half a million years, and as a result possesses several distinctive features in the formation of its bones and teeth; the Malayan has square ears instead of the typical triangular ears of the other Asiatic subspecies, and its young are said to be more hairy. Some authorities recognize additional subspecies from Borneo and Burma, but the validity of these is very questionable. The differences between the various Asiatic subspecies are in any case so trivial that it will



1 The African bush elephant, *Loxodonta africana*



2 a & b) The African bush elephant, *Loxodonta africana* (above),
compared with the Asiatic elephant, *Elephas maximus*



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not be necessary in the following pages to make any further distinction between them.

To recapitulate, there are only two survivors of the 352 species of the order Proboscidea which were formerly widely spread over most of the land surface of the globe. These are the African elephant (*Loxodonta africana*) and the Asiatic, or Indian, elephant (*Elephas maximus*). Subspecies of both these elephants are recognized, but only the African forest elephant (*Loxodonta africana cyclotis*) has any special claim to importance. Having thus cleared the decks, as it were, we will next look more closely at the elephant body, and describe how it works.

CHAPTER TWO

The Elephant Body and How It Works

THE FIRST REACTION to the elephant of young visitors to the Zoo is essentially of the "gee-whiz" variety, and is due mainly to its size. Although scientists very properly point out that the animal possesses other features at least equally remarkable, it would be difficult to argue with the conventional point of view. The attraction of sheer bulk is irresistible, and no excuse is therefore necessary for beginning an account of the elephant body with this most conspicuous of its many interesting features.

As stated in the last chapter, a large African bull may stand 11 feet 6 inches at the shoulder and weigh 7 tons. It is thus the largest living land animal. Only the giraffe exceeds the elephant in height, and only the hippopotamus and white rhinoceros are even remotely comparable in weight. But the superior height of the giraffe, which may exceed 18 feet, is due mainly to the length of its neck and legs, and no existing hippopotamus or rhinoceros has been known to weigh more than 4 tons. To find animals that greatly exceed the elephant in bulk it is necessary to go to some extinct reptiles and mammals, and to the living whales. For example, the dinosaur *Brachiosaurus* had a weight of 50 tons, and an extinct relation of the rhinoceros, known as *Baluchitherium*, was about the size of a double-decker bus. The living blue whale, with a weight of between 120 and 150 tons, is larger still, its bulk exceeding that of twenty full-grown African elephants. It is, in fact, the largest animal that has ever lived on the Earth.

There is a belief among hunters that the height of an elephant at the shoulder is equivalent to twice the circumference of the foot. This is a rough and ready guide, but does not hold good for young, growing animals, when it gives too high a figure. The

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size of a domesticated elephant is usually assessed by throwing a measure over the shoulders, bringing the ends to the ground, subtracting 16 inches to allow for the curvature of the back, and dividing the result by two. But this again is a very unreliable method owing to the variations in back curvature in animals of different ages, and the only really safe guide is a wall scale with a moving slide that can be brought down horizontally until the elephant can just stand under it. Likewise, for measuring weight, there is no alternative but to persuade the animal to stand on a weigh-bridge. Faulty measurements and wild guesses at tonnage are responsible for many exaggerated estimates of the size of the elephant body, and such statistics, especially where wild elephants are concerned, should always be regarded with the deepest suspicion.

Next to bulk, the elephant's most distinctive feature is its trunk. This is simply a very much elongated upper lip, composed of flesh and muscle, and is as necessary to the elephant as a hand is to a human being. Kipling described in the *Just So Stories* how the Elephant's Child found his trunk a most useful instrument for chastizing his relations, and a playful elephant can certainly use it to administer a hefty whack. But the trunk is not normally used for aggressive purposes, being far too sensitive and valuable an organ to be exposed to possible danger. It functions mainly as a kind of fifth limb for bringing food and water to the mouth, or collecting dust and sand to throw over its owner's body. It also plays a part in producing some of the characteristic sounds by which elephants express their wants and feelings. The blood-curdling scream of rage, imperfectly described as "trumpeting", is the sound most commonly associated with elephants in the popular imagination, but their range of emotional expression is much wider than this. G. P. Sander-son in *Thirteen Years Among the Wild Beasts of India*, published in 1878, has described a peculiar noise made with the trunk which seems to express dislike or apprehension, and which he likens to a large sheet of tin being rapidly doubled. "It is produced", he writes, "by rapping the end of the trunk smartly on the ground, a current of air, hitherto retained, being sharply emitted through the trunk, as from a valve, at the moment of impact." [2] The trunk is also used for making squeaks of

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pleasure, as when domestic elephants have been separated at work all day and meet each other again in the evening. On the other hand, the low, rumbling sound expressive of want or pain is made in the throat, the trunk simply being raised or lowered according to the intensity of feeling.

The nostrils have evolved with the lip, and their external orifices are to be found at the tip of the trunk. This makes it possible for the elephant to determine at once by its acute sense of smell whether an object is edible or not. Visitors to the Zoo will also have noticed how the single or double processes at the end of the trunk, combined with a little suction, enable the elephant to pick up objects as small and thin as a halfpenny and transfer them to its keeper's pocket. The processes have in addition an important tactile function. Their nerves can transmit messages to the brain concerning the shape, texture, temperature, and so on, of any object touched. The hairs on the shaft of the trunk, which are found in both species, but are particularly pronounced in the African elephant, also have this function, and contribute greatly to the organ's sensitivity. There are several other functions of the trunk, such as its ability to direct a stream of water at anyone its owner dislikes, but I must postpone discussion of these more light-hearted themes until later on.

Compared with the trunk the lower lip is fairly short. It nevertheless projects some distance forwards and downwards, and were it not for the dignity imparted by the trunk its spout-like shape and loose consistency would give the elephant a somewhat inane expression. The mouth is small in comparison with the size of the body, the tongue very pink and fleshy, and as soft to the touch as velvet. The ears, as already mentioned, vary greatly in size between the African and Asiatic species, but both have excellent hearing. The eyes are small and the sight poor. In addition to the upper and lower eyelids there is a third eyelid, or nictitating membrane, which moves across the eyeballs from the side. The eyelashes are long enough to suggest that they might be artificial, but the reader may rest assured that even among the most sophisticated circus elephants this is unlikely to be the case.

The teeth of the elephant are particularly interesting. In the

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majority of mammals, including man, three kinds of teeth are recognized—the incisors, the canines, and the molars. Speaking in the most general terms, the incisors are for nipping and cutting, the canines for tearing and stabbing, and the molars for grinding and chewing. But in the two living species of elephants the canines and all but two of the incisors are lacking. The two surviving incisors, which occur in the maxilla, or upper jaw, have undergone an exaggerated evolutionary development to form the tusks. Only about two-thirds of their total length is visible, the remaining portion being embedded in the bone of the skull. Some elephants have three, or even four, tusks, but this is a freak condition due to unnatural bifurcation during growth. Single-tusked elephants are also known, but most of these have probably lost one of their tusks as the result of an accident. Tuskless elephants, mostly females, are occasionally seen in Africa, and the condition is quite common in the East among both sexes.

The tusks are composed almost entirely of ivory, with a conical cap of smooth enamel at their tip, and grow continuously throughout the animal's life. They replace a pair of "milk" tusks, which never grow to more than two inches in length, and are shed between the first and second year. Neither these nor the true tusks are of any direct use in obtaining nourishment, and the food brought to the mouth by the trunk must therefore be dealt with entirely by the molars. This demonstrates the very great degree to which the elephant is specialized for the soft vegetable diet on which it lives.

The molars themselves are enormous, commonly measuring a foot or more in length and weighing up to eight or nine pounds. They consist of a number of flattened transverse plates of enamelled dentine, held together by a thick covering of the bony tissue known as cementum. When they are worn, the alternate sections of dentine and cementum show as a number of ridges and valleys, the ridges being formed of the dentine and the valleys of the cementum. The number of plates in each tooth varies considerably in the two different species. The Indian elephant can have more than twenty plates, and they are relatively narrow with roughly parallel sides. The African has a maximum of ten, which are much thicker at the centre

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than at the edges, thus giving the worn grinding surface of each plate a lozenge-shaped appearance. This character of the African elephant is the origin of the name *Loxodonta*, or "slanting toothed one".

During its life span, which is about the same as a man's, the elephant has the use of twenty-four of these remarkably constructed molar teeth. But only one, or parts of two, on each side of each jaw are in use, or in fact in existence, at any one time. While the first group of four teeth are being worn down, four



Worn molars of Asiatic (left) and African elephants, showing differing numbers and shape of transverse ridges

new teeth are growing behind them. These gradually move forward, replacing the old teeth, which are eventually shed. The process is then repeated. Each successive tooth is larger than the last, and has a greater number of transverse plates. Thus in the Indian elephant the first tooth has an average of four plates, the second eight, the third twelve, the fourth twelve, the fifth sixteen, and the sixth twenty-four. The corresponding figures for the African elephant are three, six, seven, seven, eight, and ten. When six teeth have passed through each half of each jaw no further teeth can be grown, and the animal will find itself unable to deal with its food. This is, of course, a contributory cause of

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death in wild elephants which have reached the age of sixty or so, when the last molars begin to fail.

The skull of the adult elephant is extraordinarily massive, but is nevertheless much lighter than it appears. This is because the brain case is surrounded not by solid bone but by a network of cavities, or sinuses, which are filled with air and lined with outgrowths from the mucous membrane of the nose. The evolutionary purpose of the large skull is to provide an adequate support for the tusks, and a sufficiently broad surface for attaching the enormous muscles that move the head. If the skull had evolved in size by an increase in the amount of solid bone in the cranium, it would soon have become too heavy to be easily controlled; hence the sinuses, which keep the weight down while allowing the necessary increase in volume.

The brain itself is much larger than that of a man, but this does not mean that the elephant is potentially more clever. Intelligence is not related to the absolute size of the brain, but to the ratio between this and the total weight of the body. And although the elephant's brain weighs some four times that of a man, its body weight is some forty-six times greater. There thus seems little danger that *Loxodonta* and *Elephas* will ever outclass *Homo sapiens* where intellectual matters are concerned.

Midway between the elephant's eye and ear is a slit-like orifice communicating with a gland, known as the temporal gland, lying just beneath the skin. This gland is of great interest because of its connection with the strange emotional state, known as *musth*, with which all male and some female elephants are periodically afflicted. *Musth* may occur in both wild and domestic elephants after they have reached the age of maturity, and is accompanied by great activity of the temporal glands, which become highly inflamed. At this stage a considerable puffing up of the temples takes place, followed by the exudation of a dark strong-smelling oily substance from the gland which stains much of the lower part of the face. Elephants on *musth* either suffer from violent paroxysms of excitement or become unusually dull and morose. When the madness is at its height the worst afflicted animals are often extremely dangerous, and may kill the *mahout* who has looked after them with loving care for years.

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It is generally believed that *musth* has some connection with the sexual functions, but the evidence is not conclusive. Male elephants on *musth*, although usually ready to copulate, may ignore or even attack any female who is made available to them. Conversely, elephants show sexual excitement and copulate freely when not on *musth*, and without any visible activity of the temporal glands. To make matters even more confusing, although all elephants on *musth* show the characteristic activity of the gland, it does not always follow that an animal with particularly active glands is on *musth*. A great deal of work remains to be done on this subject before the connection, if any, between *musth*, sexual behaviour, and increased activity of the temporal gland is finally established.

The rest of the elephant's body must now be briefly described. In the African elephant the vertebral column, or backbone, consists of about sixty-five individual bones, or vertebrae, of which there are seven in the neck, twenty-eight in the back proper, and between twenty-eight and thirty-three in the tail. The Asiatic elephant usually has an extra vertebra in the sacral region. The tail is a cylindrical appendage, bare for most of its length, but ending in a tuft of long black hairs. Statements that the elephant looks the same at both ends, like certain makes of American motor cars, can be discounted, as the tail is shorter and much narrower than the trunk. It apparently serves no useful purpose to its owner even as a fly whisk, but the hairs at its tip, when plaited into bracelets, are much valued as aids to allure by African natives and the wives of wealthy big game hunters. There are twenty or twenty-one rib vertebrae in the African species, nineteen or twenty in the Asiatic, each equipped with a long upward-pointing spine; the ribs themselves form a capacious chamber protecting the various soft organs of the interior. Of these the heart is particularly interesting (although not unique) in having twin apexes. Its unusual conformation led some ancient writers to believe that the elephant had two hearts, but this is incorrect. The twin apexes simply indicate that the heart is very primitive in character, resembling that of the foetus, or unborn young, of other mammals. The stomach is very big, as indeed it has to be to deal with the vast mass of vegetable matter swallowed by the elephant each day. The

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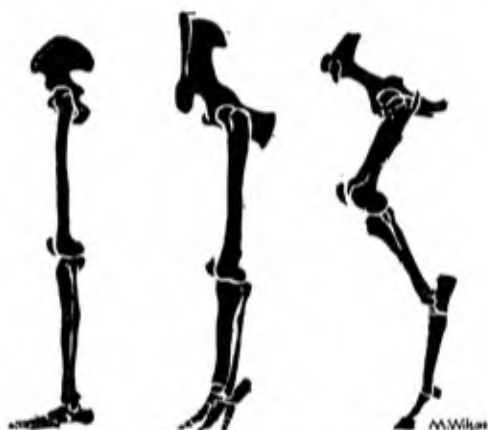
large and small intestines are about 40 feet and 70 feet long respectively and lead into a capacious rectum. The disposition of these and the other main organs of the elephant's body is shown in the diagram of a young African female reproduced on pages 48-9.

The body is encased in a layer of skin, which in places may exceed an inch in thickness. It is nevertheless extremely sensitive, and flies and mosquitos can drive an elephant to distraction. The colour is greyish-black, but there are variations between the different subspecies and the Asiatic elephant is often characterized by a number of pink and white blotches. Albino, or "white", elephants sometimes occur, and, as will be described later, are of great emotional significance in the East. Although mainly smooth, the skin is locally folded and wrinkled, especially on the hindquarters, where it hangs down loosely to form the typical "elephant pants" which make the retreating elephant such an endearing sight. Surprisingly in such a vast animal dissection normally reveals only a very thin layer of fat beneath the skin; in some specimens it may be scarcely perceptible. The excessively fat animals reported by some hunters seem to be a rare phenomenon, even when food is plentiful. Elephants perspire through their skins like human beings, and their perspiration likewise assists in regulating the body temperature, but the sweat is seldom visible even in the hottest weather. It can be most easily observed on the back immediately after the removal of the saddle.

To conclude the purely descriptive section of this chapter a word must be said about what scientists call the "appendicular skeleton", but which you and I will be content to refer to simply as the legs and feet. The legs of the elephant are one of its most distinctive features, being rounded and pillar-like with particularly strong and heavy bones. By comparison with the legs of smaller mammals they appear rather shapeless and clumsy, but their structure could not be otherwise to support the vast bulk of the torso. It is because of this specialized limb structure that the elephant is incapable of making the slightest spring. A seven-foot trench is completely impassable to an elephant, even though the maximum stride of a large specimen may be 6½ feet. The legs are also distinctive in the proportions between

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their different bones. This will be made clear by a glance at the diagram below, where the legs of an elephant, a horse and a man are drawn side by side for comparison. It will be seen that the proportions between the thigh bone (femur) and the shin bone (tibia) in man and the horse are roughly the same, whereas the elephant's thigh bone is proportionately rather longer. On the other hand, as regards the heel and ankle, man and the elephant are more akin than man and the horse. The elephant's heel is permanently raised only slightly above the



Limbs of a man (left), an elephant (centre), and a horse, showing the difference in proportion between the bones

toes and is encased with the rest of the foot in a kind of elastic cushion of flesh and muscle, which rests four-square on the ground. But the horse's heel lies much further up the leg, and projects backward as a kind of false knee, or hock. More exactly and scientifically expressed, man is plantigrade (or walks on the soles of his feet) and the horse is digitigrade (or walks literally on tiptoe). The elephant represents a mid-way stage, having a digitigrade skeleton, but being more properly considered as semi-plantigrade by reason of its supporting cushions. All elephants have five skeletal toes on each foot, but the number of nails externally visible varies between the different species and subspecies as described in Chapter One.

THE ELEPHANT BODY AND HOW IT WORKS

So far we have been discussing the various parts of the elephant body rather as if they were items in a sale catalogue or details from the specification of a motor car. Such descriptive material, involving as it does the use of certain technical terms, may have seemed somewhat tedious to the non-specialist reader, but it is necessary to the whole picture. Equally necessary, although considerably more interesting, is the study of the vital processes which cause the elephant body to function.

One of the first necessities of life for any animal is food, and by reason of their colossal size elephants make very large demands in this respect. In fact the quantity of food consumed by a single elephant in one day is so enormous that it is a cause of perennial astonishment even to those who have long been familiar with the animal. In British and American zoos and circuses a full-grown elephant will eat about 100 lbs. of hay a day, supplemented by bran, oats, and root vegetables, and as many buns as benevolent visitors can be persuaded to part with. The diet can be reduced for some months of the year to about 75 lbs. of hay, or even less, but as soon as the intake falls below this level there is a danger that the animal will lose condition. Moreover, the reduced diet applies only to resting animals, and is quite inadequate if the elephant is to be heavily worked. Another factor to bear in mind is that zoo and circus elephants are usually females; for full-grown bulls the figures must be at least doubled. Elephants in the wild eat much larger quantities of food, as a limitless supply is readily available. They seem to prefer green shoots, leaves, and tender twigs to grass, and it is therefore doubtful whether the hay that forms the staple diet of elephants in captivity arouses them to any special gastronomic enthusiasm.

In spite of the elephant's formidable molars the break-up of foodstuffs by chewing is not particularly efficient. The American scientist Dr. Francis G. Benedict, while preparing his classic monograph on elephant physiology (*The Physiology of the Elephant*, 1936), studied this subject in rather an original way. He cut up an old motor car inner tube into a number of distinctive shapes and fed them to captive elephants embedded in loaves of bread. The elephants seem to have accepted this unusual addition to their diet with characteristic sang-froid,

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and Benedict was able to confirm that in most cases the fragments of rubber reappeared in the faeces unmarked by toothmarks. The faeces also showed that the food itself was only chewed to a very limited extent before being swallowed. All those examined by Benedict were held together into unbroken balls, or boluses, by a network of hay fibres some 2 to 6 inches long which had passed through the body virtually unchanged. The boluses of one of the elephants used in the experiments also contained large fragments of unchewed beet.

Apart from the relevance of such facts in assessing the elephant's chewing power they are also evidence of an inefficient digestion. This is particularly true where hay is concerned, and Benedict worked out that an elephant only digests some 44 % of its hay intake compared with 50 % to 70 % for the cow, sheep and horse. This is of course another reason why the elephant has to consume such great quantities of food.

The elephant's thirst matches its appetite and an average daily consumption of water for a full-grown animal is between 30 and 50 gallons. Benedict describes the watering of one of the herds of captive animals which he studied in his experiments. Five or six adult animals were led twice a day to where three large tubs of water were set out ready for them. While the elephants were drinking, a hose with a 20-mm. nozzle played a strong jet of water into the tubs to replenish their contents. Yet in a very few moments all the tubs were empty, and the elephants were taking the water from the hose as fast as it was delivered.

The elephant's method of drinking is characteristic. It first draws up a complete trunkful of water by suction, then puts its trunk deep into its mouth and squirts the water down its throat. Each trunkful averages about 4 litres, or $1\frac{1}{2}$ gallons. It is sometimes said, incidentally, that the elephant can store water in a mysterious reservoir somewhere down its throat and remove a trunkful at will to squirt over itself in hot weather. Unfortunately there is no scientific basis for this picturesque superstition, which probably originated in the elephant's habit of blowing out at intervals the moisture that condenses inside the trunk. This is sometimes quite considerable, and appears as a fine and damping spray. The animal will also on occasion

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supplement this supply by putting its trunk into its mouth and withdrawing a quantity of mucous, but the moisture made available in this way is strictly limited by the normal secretion of the mucous membrane.

After food and water the third necessity of life for an elephant, as for all animals, is sleep. Surprisingly, the elephant's sleeping habits have been the cause of much argument and unscientific speculation. One would have thought that to watch such a large and conspicuous animal asleep would have been a fairly easy task. Yet for many years it was believed that the elephant either did not sleep at all, or only dozed fitfully on its feet without ever lying down. There is, in fact, some excuse for both these views, for elephants sleep extremely lightly and for only about half the time of the average human being; they also frequently doze on their feet. But this does not represent the whole truth of the matter.

A study of the elephant's sleeping habits formed an important part of Benedict's monograph. His researches were made with a number of circus elephants in America, and in particular with an Indian female named Jap. Elephants in general seem to have a remarkable tolerance of inquisitive scientists, and Jap was an outstanding example of patient good humour in all the experiments conducted on her. These included the study of her most intimate operations and, in the present instance, the invasion of her sleeping quarters by relays of observers who recorded her every action beneath the hard glare of an electric light.

Benedict's first series of observations were limited to the daytime, when Jap apparently did not sleep at all except for an occasional doze on her feet. When dozing she would stand with her trunk hanging down, its tip resting slightly curled up on the floor, her eyes closed, and with no perceptible movement of the body. None of these periods of repose lasted for more than a few minutes. The observation period was then extended to cover the full 24 hours, and continued uninterrupted for nine days. On the first night Jap was apparently disturbed by the light and by the presence of the observers in her barn, and took only a short nap standing on her feet at 3.40 a.m. On the second night, however, at 12.30 a.m. she delighted the observers by actually lying down. She went to sleep immediately and an

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hour and a half later caused even greater excitement by beginning to snore. At 2.20 a.m. she awoke and stood up, but lay down again at 3.58 a.m. and once more fell asleep. This time she switched her tail about on the floor for several minutes, but then stopped and began to breathe heavily. She awoke finally at 6 a.m., with her night's quota of sleep completed.

Benedict compiled a table setting out the number of hours each night during the nine days' observations that Jap was lying down and presumed to be asleep. Excluding the first night, the maximum and minimum figures were $3\frac{1}{2}$ hours and $1\frac{1}{2}$ hours respectively. During the whole of these eight nights Jap only slept lying down for a total of $19\frac{3}{4}$ hours. Her periods of dozing on her feet were restricted to a few brief naps as described above, and hardly added appreciably to the total. These figures, which suggest that elephants can live a healthy existence with remarkably little sleep, were later confirmed by observations on other elephants. Their publication brought Jap much acclaim in the popular Press, as well as a scientific immortality which we must hope was adequate recompense for the temporary sacrifice of her privacy.

Further aspects of the elephant's sleeping habits will be discussed later on, but we must turn now to another physiological question—the age to which elephants live. A great deal of nonsense has been talked on this subject ever since the days of the medieval naturalists, and even now circus proprietors, popular journalists, and others who live by sensationalism, are prepared to bamboozle the public with accounts of elephants well over a hundred years old. The truth of the matter, as mentioned earlier, is that the elephant has about the same life-span as a man. The highest age that has been verified with reasonable certainty is 69 years, although it is possible that occasional specimens may survive well into the seventies, and perhaps even reach the eighties. The 69-year-old elephant was an Indian female named "Jessie", who lived in the Sydney Zoo for 57 years and eventually had to be destroyed through senile infirmity. Another Indian female, named "Waddy", in the Boston Zoo, was sunken at the temples and arthritic at the known age of 50 or 51, and was not expected to live long. It is unlikely that any wild elephant reaches greater ages than these, as the loss of

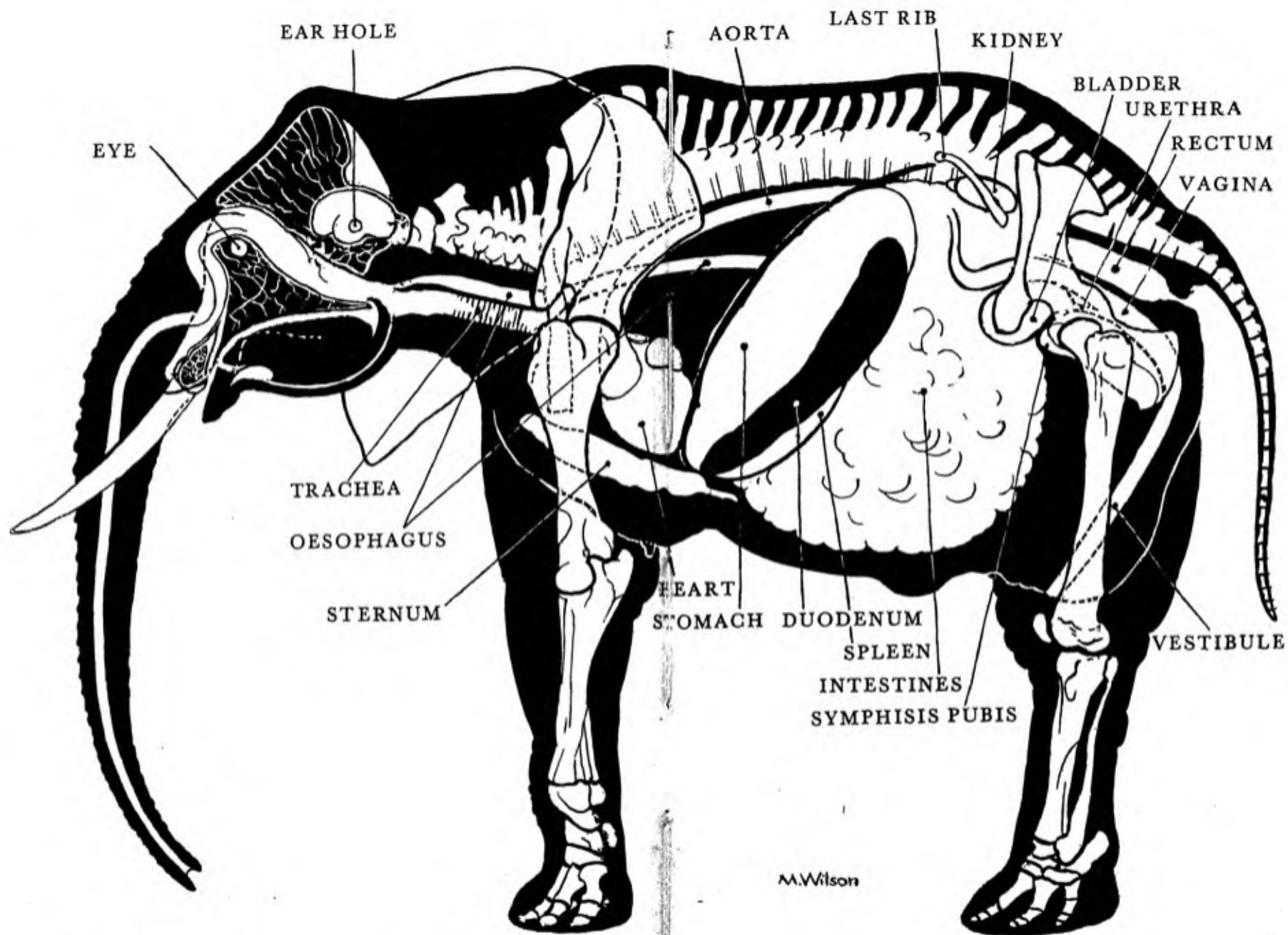
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the last molar teeth sometime in the sixties would normally precipitate death by starvation.

During the early 1930's the age of an elephant became the cause of an extraordinary international dispute. The point at issue was whether an Indian bull named "Siam" in the Budapest Zoological Gardens should be returned by Hungary to France. It was claimed that when Napoleon was in Egypt in 1798-9 he had been given by a Turkish Pasha a live elephant which he had brought back with him to Paris. He had presented the animal to his father-in-law Francis, Emperor of Austria (1768-1835), who had deposited it in the Imperial menagerie at Schönbrunn, Vienna. Here it had turned savage, and was passed on to Budapest, where, becoming docile with age, it was still alleged to be living in 1930, aged about 150 years. After the 1918 war, when France woke up to the fact that this living link with one of her greatest sons was still resident on the banks of the Danube, it was decided to demand its return. Major Stanley S. Flower, a Member of Council of the Zoological Society of London and a world authority on elephants, was asked for his opinion, which was of course that the supposed age of "Siam" was a myth and that he was not Napoleon's elephant at all. But he went further than this and, through scientific colleagues in Europe and America, established beyond all doubt that the Budapest animal had arrived there from Siam via Vienna as recently as 1900, when he was at most an eight-year-old calf. Thus the French had to forego their claim, and the 150-year-old "Napoleon's elephant" was revealed in its true colours as an animal with a maximum age of some 40 years.

So far we have restricted ourselves to a discussion of the physical make-up, or anatomy, of the elephant body, and its normal functioning, or physiology. To conclude this chapter a few words must be said about its pathology, or the way its body may misbehave as a result of sickness or accident.

Numerous textbooks on the diseases of elephants have been written, most of them dating from the great days of the British raj in India in the late nineteenth and early twentieth century. A glance through any of these, and particularly the classic *Elephants and their Diseases* by Lieut.-Colonel G. H. Evans,



The skeleton and some of the main organs of a young African elephant cow.

Note: The diagram is only intended to give a general picture of the lay-out of the elephant's interior, and makes no pretensions to scientific completeness. The intestines are only suggested, and the lungs and most of the ribs and blood vessels have had to be omitted to clarify the presentation of the other bones and organs.

Adapted by Maurice Wilson from Hill (1953b).

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reveals a formidable range of afflictions to which elephants are prone. Apart from such well-known scourges as anthrax, trypanosomiasis and foot and mouth disease, they are liable to certain diseases peculiar to themselves, such as elephant pox and paralysis of the trunk. They also suffer from their own form of certain diseases commonly found in human beings. These include diabetes, nettle-rash, pneumonia, peritonitis, flatulent colic, the common cold, and even mumps.

The most dreaded disease of all is anthrax, from which many hundreds of elephants, wild and domestic, die each year. This is a violent infective fever caused by the entry into the bloodstream of a large rod-shaped bacillus with the scientific name of *Bacillus anthracis*. The symptoms are extremely distressing, both to the animal and the observer. There is a violent shivering and trembling of the whole body, purplish blotches appear on the mouth and palate, and there is a bloody discharge from the mouth, anus and bladder. Swellings and tumours often appear on the skin, and congestion of the lungs may lead to suffocation. The animal's temperature rises rapidly from the normal of between 97.4° F. and 98° F. to 102° F. or more. In the early stages of an epidemic mortality is in the region of 90 % to 100 % and death often occurs within an hour or two of the onset of the disease. In rare instances anthrax can be passed on to man, and according to Captain C. R. S. Pitman, the ground where an elephant has died of the disease is infected for several years afterwards. He also quotes a strange case of the transmission of anthrax in the United States, where a skilled worker making piano keys from elephant tusks contracted the disease and died.[3]

Fighting and accidents also cause casualties among elephants, both in the wild and under domestication. The tusks are formidable weapons, and if driven home into the body of a rival cause ghastly wounds that often lead to death. Even if this fate is avoided the wounds will often fester and cause the animal great pain.* Such conditions can be treated comparatively

* Elephant sores, like those of other animals, often become a breeding ground for maggots, whose presence has been regarded by most writers as aggravating the animal's distress. I owe to my friend Dr. L. Harrison Matthews the information that maggots are very probably beneficial rather than the reverse. They

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simply under domestication, but the bad temper resulting from constant pain may turn a wild elephant into an aggressive and vindictive "rogue". Such animals are extremely dangerous and have been known to terrorize a whole district for months on end before being hunted down and destroyed.

The cause of death in wild elephants is usually difficult to determine, although their carcasses are not uncommonly found. Sometimes, as when in 1949 the bodies of 55 elephants were discovered in a comparatively small area of forest land in Assam, death can be safely attributed to an epidemic. In the rare cases when carcasses are found in isolation, disease may likewise have been the cause. But it will often be observed that such elephants already have the last set of molars in place, and that these have surfaces so worn as to be ineffective for mastication. It is then reasonable to assume, as suggested earlier, that the animal has been unable to deal with its food and that death has been caused by starvation. It is a reflection not without a certain poignancy that the immense power and vitality of the elephant body may thus be extinguished at last for the lack of a few ounces of dentine in its jaws.

secrete the substance known as allantoin, which is effective in drying sores. Medical practice now recognizes the therapeutic value of introducing maggots into sores artificially, and they are used in the treatment of osteomyelitis and other suppurative infections.

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CHAPTER THREE

Love Among the Elephants

SCIENTISTS, at least in their professional capacity, take an unromantic view of love. Their interest in the sexual functioning of animals is mainly confined to the anatomy and physiology of the organs of reproduction, and is strictly clinical in spirit. Although this approach is admirable in its way, most readers will probably prefer to take a less austere view of the commerce of the nuptial couch. For this reason I shall try to relate my discussion of the elephant's sexual anatomy to its love life as a whole.

Elephants are creatures of affection, and perhaps none of the so-called lower animals enriches the purely mechanical processes of reproduction with a nicer sensibility. This seems to be particularly true of the Asiatic species which has been the subject of most of the observations made. Lieut.-Colonel J. H. Williams has described in *Elephant Bill* how two elephants become attracted, court, and finally mate, with an evident fondness for each other that is far removed from the blind biological lust normally ascribed to the beasts. And I learnt myself in India during the war how elephants often showed an affection and solicitude for their mates that could well be held up as an example to members of our own species.

Before coming to the more romantic aspects of the subject, I must first dispose of a few indispensable anatomical details. The sexual organs of both male and female elephants present certain peculiarities. The testicles of the male are not visible externally, but lie within the body of the animal. The penis is, however, in the usual position, being slung in a sheath of skin along the rear of the abdominal wall. The vulva of the female, which is the opening leading to the principal organs of generation, is not situated near the anus as in many animals, but

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occupies a position corresponding to the penis in the male. The breasts, which are reduced to two as in mankind, lie much further forward than in other quadrupeds, being situated just behind the forelegs. This unusual distribution of the sexual organs led the ancient naturalists to believe that elephants must copulate face to face in the conventional human position, and this was regarded as additional proof of the animal's wisdom and intelligence. It was not until the nineteenth century was well advanced that responsible scientific investigation exploded this myth, and established that elephants mate in the position universally adopted by quadrupeds.

Female elephants come into season like other animals, and it is only at such times that they readily accept the male. The season is caused by the activity of a number of ductless glands, and particularly by the hormones (known as "gonadotropic hormones") secreted by the pituitary gland, which affect the ovaries. Observations of Asiatic elephants suggest that the female normally comes into season between December and February, and that during a single season there are a number of peak periods of heat lasting three or four days with short quiescent periods in between. Pregnancy usually lasts for between nineteen and twenty-two months, so that when the season has run its course the cycle cannot repeat itself for at least two years. There is no certain external evidence to show when a female elephant is coming into season, although some animals may exhibit at this time very slight activity of the temporal gland; but as this also occurs when the female is not on heat it is of little definitive value. The periods of heat within the season are characterized by increased excitement, a complete readiness, often amounting to positive enthusiasm, to accept the male, and, according to some authorities, the utterance of characteristic sounds. The male elephant doubtless detects the condition of his partner not only by such blandishments but by his own sense of smell.

It is not known precisely when a female elephant has her first season, and this obviously varies considerably with different individuals. Gordon Hundley, writing in the *Proceedings of the Zoological Society of London* in 1934, mentions an Asiatic female bearing her first calf at the age of fifteen, which indicates sexual

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maturity at thirteen. In 1943, in the same journal, Major Flower quotes several instances of calves being produced when their mothers were between ten and fourteen. A still earlier birth was recorded in *Das Tier und Wir*, the journal of the Munich Zoo, in June 1932, the mother being allegedly only eight years old. The baby at birth weighed about a hundred-weight instead of the usual two hundredweight, and the milk from the mother was apparently very thin and watery with a fat content of only 4% instead of the usual 20-22%. Yet the baby seemed quite healthy at the time the article appeared, as was proved by some attractive photographs showing it with its parents. This must nevertheless be regarded as an exceptional case, and the normal age for a mother to bear her first calf is probably about sixteen. But it is now firmly established that a much younger age is by no means uncommon in precocious individuals.

If was for many years believed that male elephants also went on heat during a certain regular season. This belief was based on the regular onset of the condition known as *musth* which was described in the previous chapter. But, as I have mentioned, although it seems certain that *musth* has some sexual significance, the exact way it is connected with sexual activity is unknown. Male elephants usually come on *musth* twice a year, and if they fail to do so it is a sign of bad condition. In India, bulls that have failed to come on *musth* for twelve months are usually rested, or even given temporary freedom. A bull on *musth*, if placed in the presence of a female, will do one of three things. Either he will copulate with her—in which case he will usually grow quieter, and seem partially relieved of his madness; or he will ignore her altogether; or he will attack her in the most violent and unprovoked manner. His reaction seems to depend mainly on the female's own sexual condition. If she is on heat copulation will almost certainly take place; if not, one of the other two eventualities will result. But if *musth* seems associated with sexual desire when a suitable female is available, it is certainly not essential to it. The majority of observers agree that copulation is much more frequent when the bull is not on *musth* than when he is. Thus the significance of *musth* remains a mystery.

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The young bull elephant usually comes on *musth* for the first time in his fifteenth year, but his sexual potency begins several years earlier. Reliable instances are known of elephants siring calves at eleven or twelve years old, and an elephant named "Boy" in Munich is reputed to have been a successful sire at nine. Thus elephants, like men, are capable of reproduction long before they are full grown. Full stature in both males and females is not attained until they are twenty-five years old, yet they can breed when they are half that age, and in exceptional instances even younger.

Having discussed the elephant's sexual mechanism let us now see exactly what happens when boy meets girl. Some charming stories have been woven around this theme, the majority more remarkable for romantic imagination than scientific accuracy. One of the best is quoted by Lieut.-Colonel Williams in *Elephant Bill*, and tells how the female elephant in spring digs a deep pit, equips it with fruit and fodder, and then lies down in it. She next trumpets a love call to her mate, and, when he arrives, the two animals lie in an unending embrace for a month, occasionally pausing to partake of the refreshment thoughtfully provided by the female, but otherwise dedicating themselves entirely to the business of love. This delightful concept has unfortunately never been supported by observation but, as Williams remarks, the true facts are scarcely less appealing. I should add that although elephant romances have chiefly been studied in the East, where man and the elephant have long been closely associated, there is no reason to suppose that the mating behaviour of African elephants shows any important variation. The following account can therefore be taken as reasonably characteristic of both species.

Individual male and female elephants often show a special affinity for one another, even before the onset of the female season arouses a mutual desire for sexual communion. At this stage the well-worn phrase "We're just good friends" is literally true of the relationship between the courting couple, and they show an entirely pure interest in one another by keeping regular company. But then inevitably supervene those rather less disinterested manifestations of affection which, in our own species, are a cause of much fruitless emotion in conventional

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parents. With extraordinary suddenness the two elephants fall in love.

There are, of course, certain basic differences in the approach to sexuality between the two species. Whereas in human beings the male and female are usually carried along on a progressively mounting tide of emotion, the elephant's transition from affection to desire is abrupt and dramatic. The whole relationship between the partners is suddenly electrified by the onset of the female season. Our elephantine Romeo and Juliet are caught up in the biological processes that make for the survival of the species.

Even before the crisis is upon them the male and female elephants will demonstrate their mutual regard by certain physical signs. In suitable periods of repose between the business of eating or working they will indulge in innocent dalliance, much as young human couples in spring enjoy mild flirtations during their luncheon break in the local park. The elephants will fondle one another with their trunks, stand face to face and pinch each other gently with their mouths, or butt each other playfully in the ribs. They will then resume their former activities without any sign of special excitement.

But when the female's season arrives it is apparent that certain fundamental changes take place in her metabolism which step up the whole tempo of the courtship. Not only does she herself become more ready to encourage her partner in his advances, but the changes in her body stimulate him to press his suit to its logical conclusion. Dalliance turns to serious love play, the female using all her wiles to bring the male to the peak of his desire. In this respect her techniques are far more sophisticated than those of most animals. In fact, anyone who has studied the way a female elephant encourages her lover by alternate advances and retreats, by provocative gestures of her body, and a teasing and erotic use of the trunk, will recognize her prowess as the Cleopatra of the animal world.

The love play may last for some considerable time, but the period of union is short. The male mounts the female from behind, extending his fore-legs along her back as far as the shoulders; he does not clasp the body on each side as other animals do. As soon as he has effected penetration he normally

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sinks on his hind legs until he is almost in a sitting posture; he then gradually raises himself until, when coitus ends, he is standing almost upright, with his fore-feet resting gently on the female's hindquarters. No other obvious signs of movement occur during the union, and after a certain amount of squeaking, grunting, and trumpeting during the first attempt to mount, coition is generally completed in silence. The operation lasts from twenty seconds to four minutes, although longer periods have occasionally been recorded. After congress the male moves off and remains silent; the female sometimes trumpets softly, and shows her excitement by flapping her ears and whisking her tail.

The act of union may be repeated two or three times at intervals of a few hours, and the elephant honeymoon may last for several months. The two animals keep company all day, and at dusk slip away into the forest to continue their love-making. Opinions differ concerning the period that the female will continue to accept the attentions of the male. William Bazé in his book *Just Elephants* (1955) regards three months as a fairly high estimate,[4] but Williams puts the period at ten months. In any case a point is eventually reached when the female's thoughts turn away from the pleasures of love to the more serious responsibilities of motherhood. She will begin to cold-shoulder her partner, who is at first somewhat pained by her indifference, but soon accepts it with philosophical resignation. Also, it must be admitted, his eye may by then be roving towards some other seductive siren, for elephants are no more sentimental than human beings in this respect. Thus the cycle begins again with a new partner, and the former loved one is left to pursue her self-chosen independence.

But this does not mean that pregnant females are completely deserted and left to the mercy of fate. As will be discussed later, elephants live in herds, and an expectant mother therefore has the protection of a well-developed social organization. Williams has described how after her divorce the expectant mother will seek out the company of a special female friend, or "auntie". The animals become inseparable and combine to protect the new-born calf, always grazing one on each side of it. This precaution is particularly necessary among Asiatic elephants,

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for the mortality among new-born calves from the attacks of tigers is something in the region of 25%. No corresponding figures are available of the mortality among African elephant calves from attack by lions, but they are probably lower, as lions do not normally attack elephant calves when other game is available.

The young elephant is usually born between twenty and twenty-one months after conception. Thus the gestation period is exceptionally long—although not so long as the estimates (ranging from two to nine years) made by many early naturalists. I have not been able to trace any eyewitness accounts of the birth of a wild elephant, but the event has been observed several times in captivity. Benedict (*The Physiology of the Elephant*, 1936, pp. 81-83) has quoted a graphic description of one such birth by a Denver obstetric surgeon named Mitchell Burns. The details are rather too technical to include in a book of this kind, but scientific readers, and others specially interested, are recommended to consult the original. All that need be said here is that the period of labour is fairly short, that either the head and fore-feet or, less often, the hinder parts are presented first, and that usually only one calf is dropped at each birth. The same cow normally breeds once every three years, and thus produces well over a dozen calves during her lifetime; some authorities put the number as high as twenty. Twins are probably produced on rare occasions. So far as I am aware no one has ever witnessed such an event, but Lieut.-Colonel Stockley, the well-known authority on big game, heard of two foetuses being found in a female shot on the coast of Kenya.[5] Wild elephants have occasionally been known to die in labour, for Evans reports finding one dead from this cause in the Burmese jungle;[6] my friend Captain Charles Pitman also tells me that there have been at least three recorded instances in Uganda during the past twenty-five years. Although after dropping a calf the female does not normally conceive again for a year or more, there have been occasional reports of elephants conceiving when still suckling a new-born infant. This is one explanation of the fact that cows are sometimes followed by calves of different ages.

The calf at birth is extremely hairy and weighs as much or

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more than a full-grown man. There are very few reliable statistics of the weight of new-born elephants, but 180-225 lbs. seems to be the general estimate for the Asiatic species, the African weighing rather more. The height at the shoulder is usually about 3 feet, but the animal grows quickly during its first years of life, and young elephants will double their height within five years. The growth rate then slows off, only an inch or two being added each year until the full stature is achieved sometime during the twenties.

The calf can stand on its legs within a few minutes of birth, and is walking reasonably well within the hour. The mother and her female friend remain constantly in attendance to protect it, and the herd stays in the vicinity until the calf is able to follow the mother. After about forty-eight hours the young elephant is usually ready for a short march, and mother and baby move off with the herd.

Weaning begins at about three to four months, but it seems that some calves will return to the breast for a much longer period if the mother will receive them and the supply of milk holds out. They suckle with their mouths, and the trunk at birth is exceptionally short so as not to get in the way. The common superstition that they suckle with their trunks because they are too short to reach the breasts in any other way is incorrect. The milk itself appears thinner than cow's milk, but its fat content, of about 20-22 % is roughly the same.

Elephant mothers differ greatly in their attitude to their young. It has been noted in captivity that the mother may show indifference or even hostility to her new-born calf. For example, in the birth observed by Dr. Mitchell Burns the mother knocked her baby over as soon as it made any attempt to approach her. This attitude is probably the result of a neurosis acquired from contact with human beings, for if it were common in the wild the species would fail to survive. In a more natural environment the devotion of the mother elephant to its young is not only touching but biologically sound. Several examples of maternal devotion have been recorded, of which the most striking is perhaps that quoted by Williams in *Elephant Bill*. He tells how one of his working elephants named Ma Shwe (or Miss Gold) was trapped in the flooded Taungdwin river in Burma with her

three-months-old calf. The calf was screaming with terror and bobbing about in the water like a cork. It was in constant danger of being swept away, but by tremendous efforts the mother kept hooking it back with her trunk and pressing it against the side of her body. Eventually a sudden rise in the water tore the calf from her side and swept it downstream. Although the river was now a raging torrent, the mother plunged after it and with great difficulty managed to catch it again. She pinned it with her head and trunk against the bank, and then, by a tremendous feat of strength, lifted it completely clear of the water with her trunk and deposited it in safety on a rocky ledge some five feet above flood level. A second later she herself was swept away, and Williams thought she would probably be dashed to pieces in a gorge some three hundred yards downstream. However, she managed to escape, and came hurrying back to where she had left her baby, at first roaring anxiously, and then rumbling with pleasure to see the calf still safe. But unfortunately she had got out of the river on the opposite bank, and the two animals were separated by the torrent. Night was falling and there was nothing that could be done to help. Williams went down several times during the evening and found the calf still on its ledge; but the beam of his torch seemed to disturb the animal, so he decided to leave it in peace till morning. At first light he was relieved to find that the flood level had fallen and Ma Shwe and her baby were reunited. As the river subsided she had obviously plunged into the water once more and lifted down the calf from the ledge in the same way as she had put it there.

This story of courage and altruism is typical of the character of the elephant. Nor can the animals behaviour be entirely explained as an expression of biological instinct. By deserting her calf in the early stages of the drama she could have saved her own life without difficulty, and thus survived to produce many more members of her species. Instead she preferred to risk death in what must have been a terrifying ordeal with the slight hope of saving the offspring she loved.

CHAPTER FOUR

Elephants in the Wild

SO FAR IN THIS BOOK I have been dealing mainly with the classification, anatomy, and physiology of elephants, and such references as I have made to their habits have been restricted to instances which seemed to illustrate some particular point. In this chapter I shall attempt to depict the elephant in its natural environment, and give a general account of its daily life in the wild. It is sad to realize, incidentally, that opportunities for studying this subject cannot last for many more years. By the end of this century the truly wild elephant will probably have ceased to exist, and the elephant population of the world will be restricted to a number of semi-domestic herds in the artificially created national parks.

In this general context I do not propose to give separate accounts of the habits of the two different species. There are, of course, certain variations between them, and even between elephants of the same species in different areas, but on the whole the behaviour patterns of wild elephants are very much alike wherever they are found. I shall therefore only refer to their differences when these are especially remarkable.

Wild elephants occupy a wide range of environments and seem equally at home in all of them. They adapt themselves quite happily to life in forest or bush, on high temperate plateaux or sweltering coastal plains, in the sultry valleys of Ceylon or on the mist-covered slopes of African mountains between 8,000 and 12,000 feet above sea level. In fact, if an adequate supply of food and water is readily available elephants can be happy almost anywhere. In this they show an admirable detachment from the external circumstances of their lives which must give cause for envy even to members of the human race.

The social unit of life in the elephant world is the herd. This

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is an association of individuals who are more or less closely related to one another. The herd will include parents and children, brothers and sisters, uncles, aunts, nephews, nieces, and possibly a sprinkling of in-laws who have been accepted into the herd from outside. The number of individuals will vary considerably, ranging from ten or twelve in a small herd to fifty or more in a large one. Some herds are even larger than this, and I have seen vast assemblages of African elephants on the Nile and in Tanganyika between one and two hundred strong. These exceptionally large herds are not composed of members of the same family, but are temporary associations of smaller herds brought together in one place by seasonal shortages of water and pasturage. While the shortage lasts, the smaller herds will remain together in the region of the supply, but as conditions improve they will split up once more into their original family groups. During the period of association they constantly intermingle, and it is possible that a certain interchange of individuals may take place before the family herds fan out into their former habitats. New social units may also be formed at these times, as a result of two animals from different herds going off on one of the elephantine honeymoons described in the previous chapter and thus forming the nucleus of a herd of their own.

Each herd has an acknowledged leader, and most naturalists agree that this is usually a female. At first the idea of a female leader may seem rather unusual, but we should remember that a matriarchal organization is also found among other kinds of animals and in many human societies. Anthropologists can study the system in most of its ramifications among numerous primitive tribes and even, in somewhat disguised form, in the United States.

The bull elephant is not without his uses, however. His size alone is expressive of physical power, and his superior armament in the form of larger tusks enables him to present a bold front to the world in case of danger. He is, in fact, both virile and handsome, and it would be rash to assume that these qualities do not excite the same emotional reactions among the female of the species in the elephant world as they do in the world of men. On occasion, also, bulls can exhibit a comforting tender-

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ness, and numerous writers have remarked on the touching attentions they pay to their mates during the period of the honeymoon.

But in other respects it must be admitted that the male elephant is conspicuously lacking in the domestic virtues. When his partner's pregnancy causes her to resist his advances, he will be only too ready to cast his eyes towards some new paramour. Worse still, by the time his child is born, he has become frankly bored with the whole affair, and it is even doubtful if he recognizes the calf as his own. Male elephants, especially if they have reached mature age, are as impatient with youth as cantankerous clubmen, and it often happens that two or three of the older bulls will live detached from the herd, which they rejoin only for such activities as drinking and bathing. These crusty old gentlemen enjoy in their chosen retreat a privacy as inviolable as that of the Smoking Room at the Athenæum, and other members of the herd who approach them do so at their peril. The cows and adolescents are usually circumspect, having learnt by painful experience of the dire penalties inflicted on the persistent interloper, but the calves are for a time more bold and mischievous. Many a calf who has thought it would be amusing to butt one of his seniors in the ribs has retreated hastily with ears singing from a well-directed swipe of the trunk.

As opposed to the indifference of the bulls, the cows are remarkably good with their young. They will fondle them affectionately with their trunks, wash them, and keep a constant eye on them to see that they do not stray into danger; they also impose a rigid discipline, and spank them severely whenever their youthful high spirits cause them to be insubordinate. But such severity is based on genuine maternal affection and, moreover, extends to calves other than the mother's own. It is an appealing trait in elephants that, if a calf is orphaned, it will always find another cow in the herd who will accept it as her foster-child.

When the herd is on the move the cows usually go first, their calves trotting behind them, and it is charming to see how they adapt their stride to enable the youngsters to keep up. If a sudden alarm causes the herd to take flight, the bulls, being

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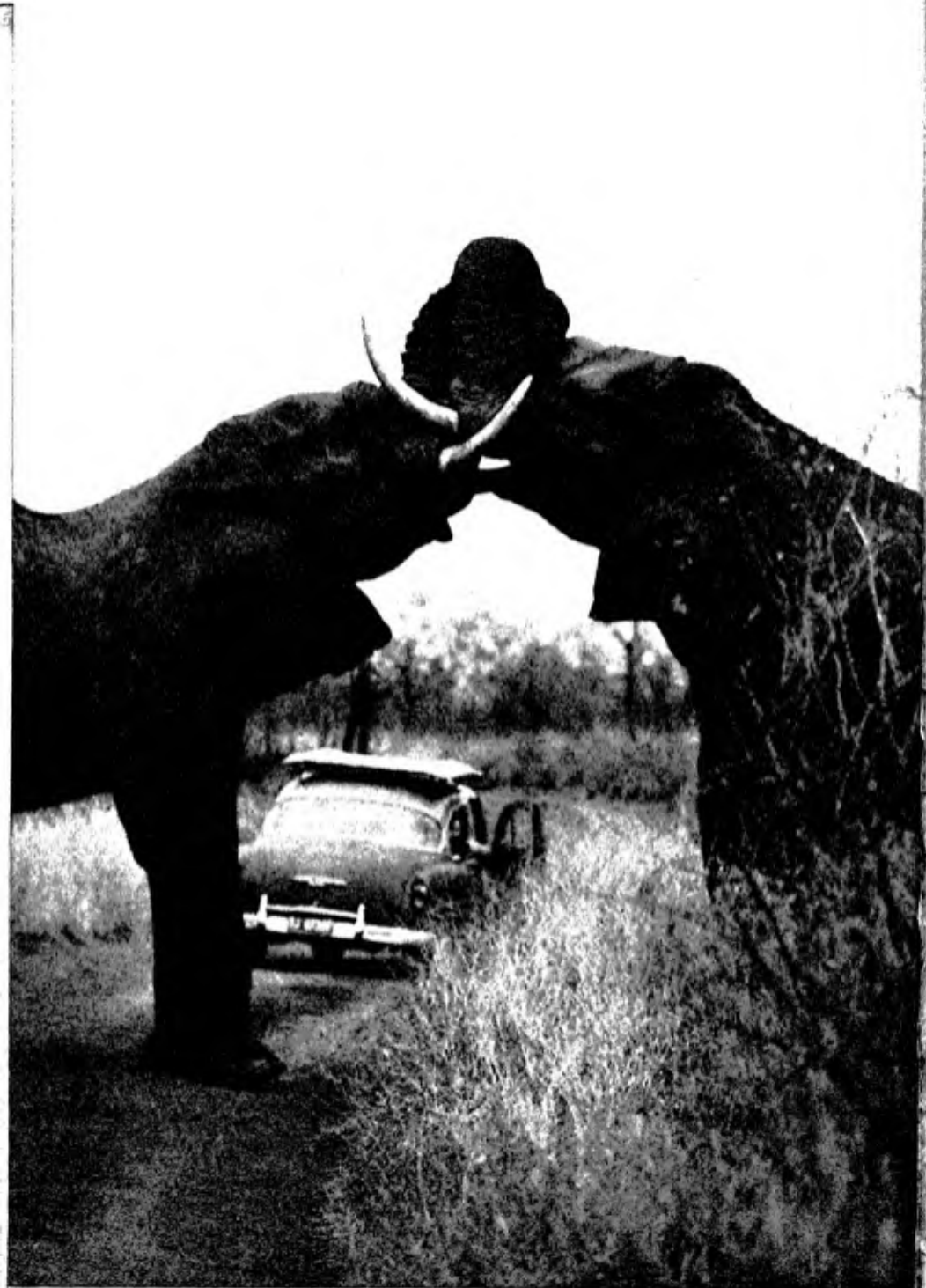
unencumbered, hurry on ahead, but the cows will always stick with their calves, however dire and imminent the danger. If a river has to be crossed the mothers will support the calves in front of them with their trunks. At steep places they will guide them onto the easiest paths, or help them forward with a gentle shove from behind.

Elephants on the move normally travel in single file. The younger bulls and older bulls sometimes form separate contingents, and it is unusual for any but adolescents to mingle with the cows and calves. The normal marching speed is about six miles an hour, but looks rather slower due to the characteristic gait. This is a kind of ambling walk, which can be increased in an emergency to a fast shuffle of about fifteen miles an hour. The elephant can neither trot, canter nor gallop, and even when charging does not travel at more than about eighteen miles an hour. In the charge the feet seem to be thrown forward and outward in a most distinctive way, but for obvious reasons no one has ever paused long enough to observe this phenomenon in any detail. The full speed of the charge cannot be maintained for more than a few yards, but it is doubtful whether even the fastest runner could escape from a charging elephant unless there was also some possibility of concealment.

Elephants migrate considerable distances, but the reason for this has not yet been fully explained. As previously stated, they can tolerate a wide range of temperature, so seasonal changes in climate can have little to do with their movements. The obvious explanation that they follow the supply of food and drink is not in itself sufficient, for even when both these necessities of life are present they will still readily shift their terrain. Another suggestion is that the migrations are based not so much on the general supply of food as on the seasonal availability of certain plants of which the animals are particularly fond. For instance, Stockley has suggested that the elephant migrates to the higher slopes of Mount Kenya in January and February because of the supply of berries of the *mukaita* tree (*Rapanea rhododendroides*) to be found there at this season. These are much sought after by the local Africans as a cure for stomach ailments, and Stockley believes the elephant may also find them of medicinal value.[7] Yet another theory is that elephants



3 The elephant's mouth



4 Elephants are creatures of affection (see chapter 3)

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migrate to avoid the many insect pests that afflict them at different seasons of the year. Thus in *Thirteen Years Among the Wild Beasts of India* G. P. Sanderson says that one of the reasons for the elephants leaving the hills during continued rains is the annoyance caused by the flies and mosquitoes which then become very troublesome. He continues:

The elephant-fly is always less numerous in the low-country jungles. This truly formidable pest appears in the rains; it lives mostly in long grass, and attacks bison and sambur as well as elephants. When the grass becomes very wet, these flies collect on any passing animals, and so great is the irritation they cause, that elephants and bison are always found about the outskirts of the jungle at this time. The elephant-fly is dark grey in colour, about the size of a small bee, and has a most formidable proboscis; it is very soft, and the slightest blow kills it.[8]

Much more research will be necessary before we discover the cause of elephant migrations, and perhaps a combination of several of the theories mentioned will eventually be accepted as providing the true explanation. Meanwhile I am inclined to regard the gastronomic theory as the most convincing, for elephants always show great discrimination in the matter of food. They prefer browsing to grazing, and are particularly fond of green leaves and the tender shoots of leguminous plants; they also eat twig ends and the soft bark of young trees, tearing the latter off with their tusks and then putting them into their mouths with their trunks. On the occasions when they graze they naturally prefer the lush green grass that springs up after the rains, and eat dry grass and hay from necessity rather than choice. It is amusing to watch grazing elephants select a large clump of the best grass they can see, pull it up by the roots with their trunks, and then knock off the loose earth against their knees before tucking it into their mouths.

When much coveted shoots are too high up a tree to be reached even with the tip of the trunk the elephant will adopt the simple expedient of pushing the tree down. This is usually done with the forehead, by a series of sustained lunges punctuated by brief periods of withdrawal; after a few moments the tree begins to totter and then, with a crack of breaking roots,

falls to the ground in a cloud of dust. The elephant walks complacently round to the head of the tree and begins to feed, allowing his cronies to join in with the greatest good nature, even though they have expended no energy in procuring the feast. I have seen elephants in Africa deal in this way with trees measuring nearly 2 feet in diameter and 30 feet high; smaller trees usually snap off at the base before they can be uprooted. The former feeding grounds of a herd can easily be identified by the quantity of mangled timber which lies about over an area of many acres. When elephants have been feeding in the same area for several weeks the whole region is as devastated as a battlefield, and takes years to recover its former fertility.

Apart from their staple diet of green food, elephants are very partial to salt. They will travel many miles to a good salt lick, where they sweep up the salt in their trunks with every appearance of satisfaction. Coconuts are regarded as a special delicacy, and when they are ripe on the wild palms the elephants will congregate in the region and live on them for weeks. They first dispose of the fruit that has already dropped, and then encourage a further supply by butting the trees with their foreheads or shaking them with their trunks, rather as small boys obtain succulent apples when raiding orchards. They break the coconut open by pressing it gently with one of their fore-feet, and it is interesting to see how nicely they calculate the pressure so that the husk and shell are broken open without crushing their contents. The roots of the young palms are also regarded as a delicacy, and are eaten by natives as well as elephants when other food is short.[9]

No elephant can resist mangoes, plantain stems, maize, or sugar cane, and they often wander onto cultivated land in search of these delicacies. A raiding herd can do an enormous amount of damage in a very short time, not only to the crops themselves but to telegraph poles, dam embankments and similar obstructions which may get in their way. Yet they are strangely wary of fences, perhaps suspecting them of being some sort of trap, and will walk a long distance to find an opening rather than break down the flimsiest of barriers. At times they will try to prevent the construction of a fence in a way that shows a well-developed sense of humour. Thus Stockley tells

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how a friend of his in Kenya had begun the construction of a fence to keep buffalo off his estate. The holes had all been dug, the fencing posts erected, and the holes filled in, but before the wire could be stretched between the posts a small herd of elephants walked the whole length of the fence, pulled up each post and laid it neatly beside its hole.

Wild elephants feed for at least sixteen hours out of every twenty-four and thus eat far more than elephants in captivity. Estimates of the consumption of a large bull vary between 3 and 6 cwt. a day, and no one who has observed the habits of elephants in the wild will regard this as an exaggeration. The herd moves slowly through the bush, browsing all the time. Except for a few short spells in the heat of the day, when they may doze on their feet in the shade, their jaws never stop working. A deep rumbling noise can be heard in their stomachs as their digestive juices attempt to cope with the enormous mass of vegetation that is being constantly sent down.* They break wind with unrepressed abandon, and excrete the waste products of their enormous intake by frequent defecations. The elephant body is, in fact, like a gigantic and rather wasteful factory, using far more fuel than is necessary to ensure its own efficient operation, and squandering at least 50% of its potential in the form of imperfectly digested boluses.

Watching an elephant drink, one is reminded of someone filling a cistern with a bucket. The trunk is filled from the supply and the water poured down the throat with a noise like a gurgling drain, the process being repeated until the cistern is full. The herd usually appears in force at the river or water-hole early in the morning, and drinking lasts anything from ten minutes to half an hour. The animals then wander off into the bush in loose formation to begin the day's feeding. In the evening they usually return to the water, and individuals who become exceptionally hot will sometimes come down to drink during the day. When I was at Juba in the southern Sudan in 1956 it was not uncommon for the afternoon ferry across the

* Connoisseurs of picturesque words may be interested to learn that these intestinal noises are known to scientists by the delightful name of 'borborygmus'. They should not be confused with the characteristic rumble of content which elephants voluntarily emit when indulging in any pleasurable activity.

Nile to be held up because a couple of thirsty elephants were watering themselves on the landing-stage.

It has often been remarked that captive elephants have a passion for alcohol. Nearly every elephant worth his salt will knock back a gallon of beer with the enthusiasm of a cricket team after a thirsty match, and Charles Holder in *The Ivory King* mentions an elephant that could draw a cork from a bottle of claret and drink the contents without spilling a drop.[10] Liquor of this quality is unfortunately seldom available to elephants in the wild, but they show an almost human enjoyment of such substitutes as can be obtained. For example, Commander Blunt tells in his book *Elephant* of a wild elephant who acquired such a passion for fermented millet that he made nightly sallies into an African village to obtain it, showing complete disdain for the usual methods of scaring away raiders.[11] Another example of the elephant's craving for the demon alcohol is quoted by the Hon. W. H. Drummond in his book *The Large Game and Natural History of South and South-east Africa*, published in 1875. He writes:

They frequent, as I have mentioned, the country from the Pongolo northward, during the summer season, retiring to their fortresses in the interior at the approach of winter. The time of their arrival is simultaneous with the ripening of the fruit of the umganu-tree, of which they are passionately fond, and doubtless come in search of. This fruit is capable of being made into a strong intoxicating drink, and the elephants after eating it become quite tipsy, staggering about, playing huge antics, screaming so as to be heard miles off, and not seldom having tremendous fights.[12]

Sanderson reported similar habits among the elephants of India, although he was unable to identify the particular fruit that caused the festive mood.

In spite of their size elephants, at least when sober, are never clumsy. If a herd is alarmed the calves disappear under their mothers, and should a stampede occur it is astonishing that they are not trampled and injured. Yet the known cases of a calf being injured in the most violent of stampedes are so few as to be negligible. The bulkiest elephant moves through the jungle with astonishingly little noise, and is a master at the art of concealment. I remember once trying to photograph a magnifi-

cent bull on the Kenya-Tanganyika border. My companion and I were on foot, and the elephant was approaching us along the further side of a row of bushes. We hurried, as we thought, unobserved, to the end of the row, where we waited for him to appear. There was complete silence, and as within half a minute he was not visible, we peered round the last bush, half expecting to meet him face to face. Instead, although the cover was by no means dense, we found he had completely disappeared. We followed in the only direction he could have taken, but never saw him again. He had become aware of our presence and vanished as softly and silently as a ghost.

On their migrations elephants will often negotiate formidable obstacles lying in the path of their march. For instance, they are remarkably good swimmers, and are undeterred by the broadest rivers. Sanderson gives a remarkable example of their prowess in this respect:

Full-grown elephants swim perhaps better than any other land animals. A batch of seventy-nine that I despatched from Dacca to Barrackpur, near Calcutta, in November 1875, had the Ganges and several of its large tidal branches to cross. In the longest swim they were six hours without touching the bottom; after a rest on a sand-bank, they completed the swim in three more; not one was lost. I have heard of more remarkable swims than this.[13]

More recently a case has been recorded by Lieut.-Colonel Williams of an elephant that went for a two-hundred-mile island-hopping jaunt in the Bay of Bengal. The animal took twelve years to complete the journey and some of the hops from island to island were across at least a mile of open ocean.[14].

In Africa few rivers are sufficiently deep to cause so large an animal as an elephant to need to swim, and it is customary for the migrating herds to ford them. Often the water does not rise above the thighs, but sometimes it will cover the animals completely; they will then walk across the river bed with only the tip of their trunks showing like periscopes above the surface.

Native hunters are sometimes able to take advantage of elephants crossing a river in this way. They attach a weight to a spear by a piece of rope and then spear the trunk from their canoes. The weight drags the trunk down and the unfortunate

animal drowns. Some eight hours later the gases inside the carcase cause it to float, when it is recovered by the natives for food.

Elephants will sometimes go swimming, or wallow in muddy pools, for the sheer joy of being in the water. An elephant bathing party is a most entertaining sight. The animals splash and trumpet, squirt water over themselves, or lie at full length with the contented expressions of elderly gentlemen surf bathing at the edge of the sea. The calves dash about on the shore in playful pursuit of one another, squeaking with excitement and pushing each other into the water. The cheekier among them butt their recumbent mothers playfully in the ribs or squirt water from their trunks in the general direction of some dignified old bull.

Mountains and steep places are as easily negotiated by a migrating elephant as rivers, and even the largest bulls are remarkably sure footed. In *A Hunter's Wanderings in Africa* the famous big-game hunter Frederick Courteney Selous writes:

The hills here [close to the Zambesi] were higher and more rugged and precipitous than those I had been hunting amongst farther to the eastward, and in many of the deep narrow ravines the scenery was most striking. Though the sides of these kloofs* in some cases were almost perpendicular, several trees had nevertheless found a hold for their roots in the interstices of the rocks, and amongst them the fantastic-shaped baobabs, with their long leafless limbs, looked particularly strange.

At first sight, many of these cliffs appeared inaccessible to any animal but a baboon; but we found that the elephants had made regular paths up and down many of them, which paths zigzagged backwards and forwards like a road down a Swiss mountain, and in some places great blocks of stone had been forced aside by the efforts of these bulky engineers, in order to render their footing the more secure.[15]

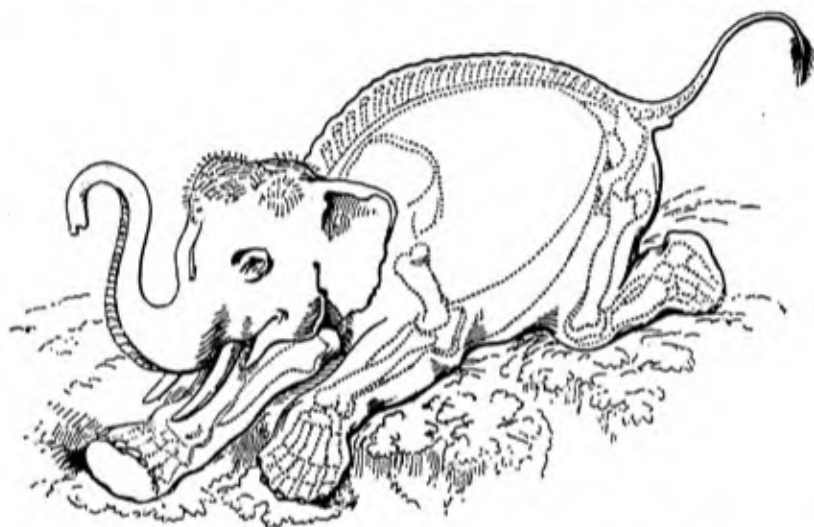
Elephants negotiate such difficult paths with great skill. On dangerous ledges and steep slopes they pick their way with extreme caution, often testing doubtful spots with their forefeet before trusting them with their full weight. When the slope

* i.e. clefts (Dutch). In South Africa the word has the special sense of a ravine or gorge between mountains.—R. C.

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is less pronounced they stride out confidently, but with a swaying motion dictated by the steepness of the gradient. As Stockley remarks: "The nautical roll of a big bull going away slightly uphill is most pronounced, almost inducing one to break into a chanty." [16]

Elephants remain undismayed even when a hill-side is too steep for them to negotiate on their feet. In volume 13 of the *Journal of the Asiatic Society of Bengal* (1844) there appeared over the signature J. G. F. a quotation from the *Indian Sporting*



Elephant descending a steep slope. From Tennent (1867)

Review describing exactly how an elephant proceeds when descending an exceptionally precipitous slope. It was accompanied by a charming illustration, and read as follows:

His first manœuvre is to kneel down close to the edge of the declivity, having his chest upon the ground; one fore leg is then carefully passed a short way down the slope, and if there is no natural projection adapted for firm footing, a step is speedily kicked out of, or pressed into the soil, according to the state of dryness or moisture it may be in. This point gained, the other fore leg is also brought down, and performs the same work a little in advance of the first, which is now at liberty to move still lower

—when, first one and then the other hind leg is cautiously slid over the side, and the hind feet in turn occupy the resting-places made, used, and left by the fore ones; and so on, the course not being direct from top to bottom but sideways, until the level be regained. This is done at more than an angle of 45°. . . .

This passage, incidentally, was quoted by the eminent naturalist Sir James Emerson Tennent in his book *The Wild Elephant* (1867), but with such radical alteration of the writer's style that, in my opinion, the changes tended to obscure and not illuminate the meaning. Sir James also printed a modified version of the illustration, but as this was clearer than the original without falsifying it, it is the one I have chosen for reproduction here.

The character of elephants in the wild has been discussed by many writers, and all are agreed that they are naturally of a peaceable disposition. But persecution by man has made them wary, suspicious, and often aggressive, and their peaceful appearance can be dangerously deceptive. On a recent visit to one of the African national parks I was told the story of a rash tourist who alighted from his motor car near a quietly grazing bull elephant and offered him a bun. The elephant immediately seized him with his trunk, threw him twenty feet into the air and then knelt on him. The man was crushed to pulp, and the elephant then turned his attention to his victim's motor car, from which the other occupants had hastily fled. By the use of trunk, tusks, and limbs he proceeded systematically to demolish it, and did not desist until it was an unrecognizable hulk of twisted metal.

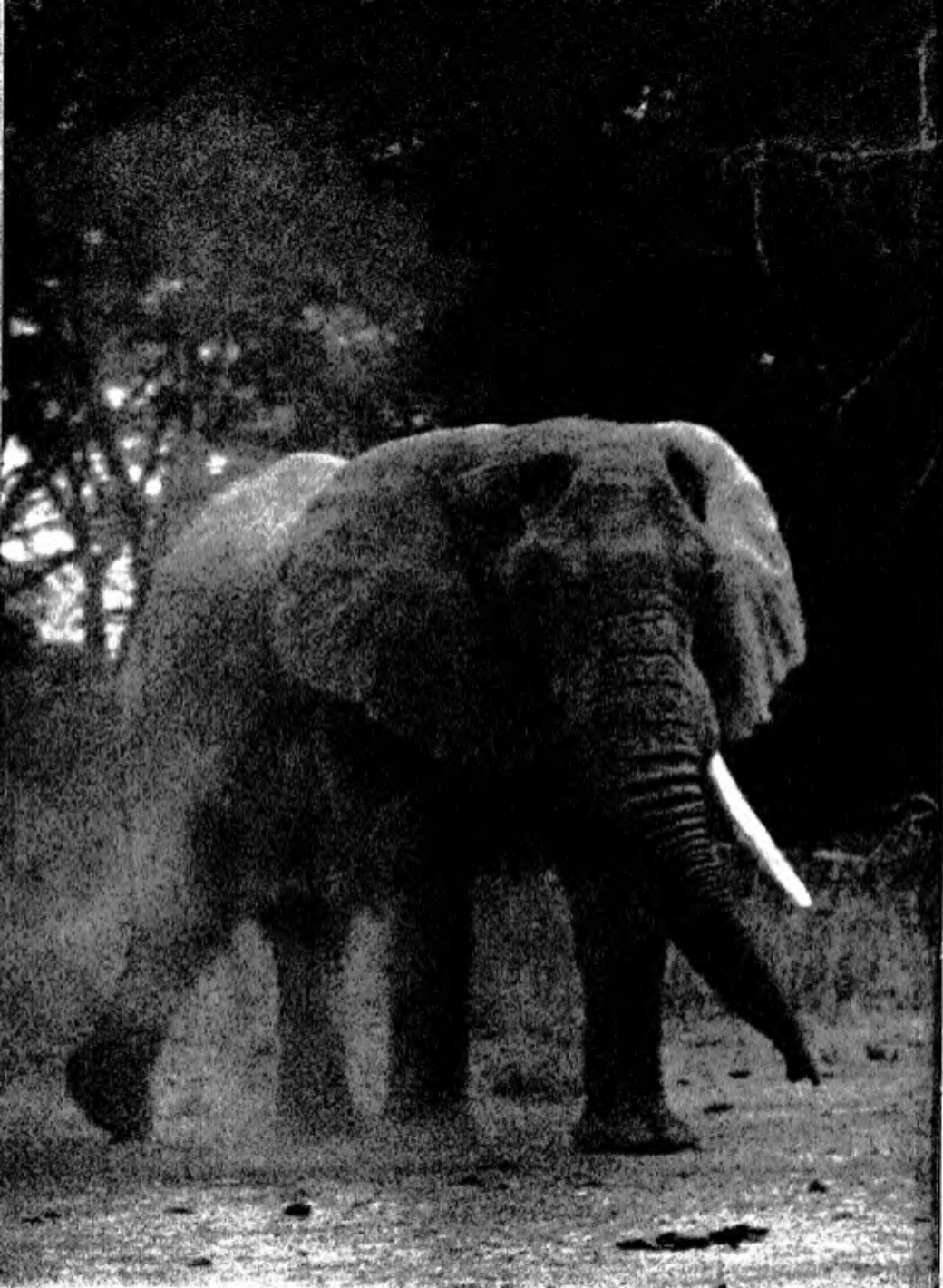
Cows are usually more aggressive than bulls, and a pregnant cow or a mother with a young calf is always dangerous. At first this seems surprising, as bulls are more persecuted than cows for their superior ivory. But the attitude is probably due to the great burden of responsibility borne by the cows in caring for their calves, on whose successful rearing depends the survival of the herd, and ultimately of the species. Single cows are dangerous enough, but when several are collected together they can be a really serious menace. A case in point was the famous herd, containing no bulls at all, which used to terrorize a region of 150 square miles around Gondokoro in the southern Sudan. It



3 a) African elephants drinking

b) African elephants browsing





6 Angry elephant about to charge, Northern Province, Tanganyika Territory

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was known to everyone in the district as the "suffragette herd" and its irascible members would charge an intruder on sight. It is tempting to regard this behaviour as an inevitable result of the absence of male society (and indeed there are certain parallels to be drawn with the human species), but this is a point on which it might be unwise to commit oneself.

Elephants are seldom bad tempered with each other, but occasionally ferocious battles occur between rival males. They fight head to head, either attempting to push one another backwards with their foreheads, or intertwining their trunks and engaging in a titanic tug of war, so that one animal is drawn onto the other's tusks. The struggle may continue until one of the contestants is killed. This usually happens through the weaker elephant breaking away, thereby exposing his unprotected flank to the tusks of his opponent. When thus caught at a disadvantage an elephant can be disembowelled with a quick lunge of the head. The bodies of elephants are sometimes found with their heads battered in, their abdomens ripped open, and great holes torn out of their sides, bearing witness to the ferocity of the struggle. According to Holder: "Females rarely fight among themselves; but, when they do, their spite is vented upon one another in a ludicrous and aggravating manner, by biting off each other's tails." [17] This practice can be regarded as the elephantine equivalent to squabbling school-girls pulling each other's hair.

Much has been written on the subject of the elephant's intelligence and a belief has arisen that, like Kipling's shipwrecked Mariner, they are creatures of infinite-resource-and-sagacity. It is true that, when domesticated, an elephant has an exceptional aptitude for absorbing instruction, and is remarkably docile and gentle for such an enormous creature. But whether it has any highly developed reasoning powers of its own is a more debatable point, and many instances have been quoted to prove the contrary. For instance, E. P. Gee, writing in *Loris* (the journal of the Ceylon Game and Fauna Protection Society) in 1948, cites an instance of an elephant in Ceylon which got one of its hind legs wedged in the low fork of a tree. It pulled madly for fourteen days, and eventually died of exhaustion and starvation, when it only had to lift the leg

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slightly to free itself. Sir Samuel White Baker, one of the greatest big-game hunters of the nineteenth century and a leading authority on wild animals, likewise had a very poor opinion of the elephant's intelligence. In *Wild Beasts and Their Ways* (1890) he gives several examples of the elephant's intellectual shortcomings, and compares it, to its detriment, with the dog.[18] But as his strictures are mainly based on the elephant's tiresome refusal to "volunteer his services" to man without first being caught and trained, and its readiness to retreat "in a disgraceful panic" when attacked by other wild animals (including presumably big-game hunters), I here remain firmly on the elephant's side.

There is certainly no scientific reason why the elephant should exhibit exceptional intelligence. As previously stated, its brain when considered in relation to its body size is comparatively small. Its intelligence potential is, of course, vastly inferior to man's, and compares unfavourably with that of many less publicized mammals. In fact, it is doubtful if the mental powers of the elephant are very much greater than those of the horse. And the horse, as those of us who are not sentimentalists will probably admit, is naturally a rather silly creature.

But when all this has been said it would be only fair to put the other side of the question. Several travellers have recounted experiences which suggest that the elephant, if not a genius, at least possesses his fair share of reasoning ability. The most striking example I have come across is related in a letter from a certain Major Skinner, an Indian army surveyor, to Sir James Emerson Tennent, and printed in Tennent's book *The Wild Elephant*, published in 1867. If it is true—and there is no reason to suppose that it is not, even though Sir James may have "improved" the style somewhat as was his habit—it is certainly a remarkable instance of the elephant's fabled sagacity. Skinner's communication reads as follows:

In the height of the dry season in Neuera-Kalawa, you know the streams are all dried up, and the tanks* nearly so. All the animals are then sorely pressed for water, and they congregate in the vicinity of those tanks in which there may remain ever so little of the precious element.

* In India the word 'tank' signifies a pool, lake, or reservoir.—R. C.

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During one of those seasons I was encamped on the bund or embankment of a very small tank, the water in which was so dried that its surface could not have exceeded an area of 500 square yards. It was the only pool within many miles, and I knew that of necessity a very large herd of elephants, which had been in the neighbourhood all day, must resort to it at night.

On the lower side of the tank, and in a line with the embankment, was a thick forest, in which the elephants sheltered themselves during the day. On the upper side and all around the tank there was a considerable margin of open ground. It was one of those beautiful bright, clear, moonlight nights, when objects could be seen almost as distinctly as by day, and I determined to avail myself of the opportunity to observe the movements of the herd, which had already manifested some uneasiness at our presence. The locality was very favourable for my purpose, and an enormous tree projecting over the tank afforded me a secure lodgement in its branches. Having ordered the fires of my camp to be extinguished at an early hour, and all my followers to retire to rest, I took up my post of observation on the overhanging bough; but I had to remain for upwards of two hours before anything was to be seen or heard of the elephants, although I knew they were within 500 yards of me. At length, about the distance of 300 yards from the water, an unusually large elephant issued from the dense cover, and advanced cautiously across the open ground to within 100 yards of the tank, where he stood perfectly motionless. So quiet had the elephants become (although they had been roaring and breaking the jungle throughout the day and evening), that not a movement was now to be heard. The huge vidette* remained in his position, still as a rock, for a few minutes, and then made three successive stealthy advances of several yards (halting for some minutes between each, with ears bent forward to catch the slightest sound), and in this way he moved slowly up to the water's edge. Still he did not venture to quench his thirst, for though his fore feet were partially in the tank and his vast body was reflected clear in the water, he remained for some minutes listening in perfect stillness. Not a motion could be perceived in himself or his shadow. He returned cautiously and slowly to the position he had at first taken up on emerging from the forest. Here in a little while he was joined by five others, with which he again proceeded as cautiously, but less slowly than before, to within a few yards of the tank, and then posted his

* i.e. scout, spy, look-out.—R. C.

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patrols. He then re-entered the forest and collected around him the whole herd, which must have amounted to between 80 and 100 individuals,—led them across the open ground with the most extraordinary composure and quietness, till he joined the advance guard, when he left them for a moment and repeated his former reconnaissance at the edge of the tank. After which, having apparently satisfied himself that all was safe, he returned and obviously gave the order to advance, for in a moment the whole herd rushed into the water with a degree of unreserved confidence, so opposite to the caution and timidity which had marked their previous movements, that nothing will ever persuade me that there was not rational and preconcerted co-operation throughout the whole party, and a degree of responsible authority exercised by the patriarch leader.[19]

The caution shown by the elephants in this episode is a characteristic trait. No animal is more wary of unfamiliar objects, nor more quick to take fright for the most unaccountable reasons. Temperamentally the elephant is not unlike the horse in this respect, which will shy at its own shadow and panic at the slightest provocation. Elephants also have an instinctive preoccupation with their own safety which amounts almost to neurosis. For example, even domesticated elephants who have acquired great confidence in their human masters will often refuse to cross a bridge before they have tested its strength carefully with their fore-feet, or rapped it smartly with the tip of their trunks, rather as a surveyor tests the soundness of a plaster-board partition. This is not to say that such behaviour reflects on the elephant's character, and on one view it could be taken as additional proof of his intelligence; but it is odd to find such excessive timidity in an animal so large and strong, and possessing such a calm and stolid appearance.

On the other hand, elephants can on occasion be extremely bold. Their boldness is due less to bravery than to their extreme inquisitiveness—the “satiabie curiosity” which Kipling remarked as being such an outstanding characteristic of the Elephant's Child. Calves, or elephant's children, are in fact the arch examples of this trait; this is exemplified by the following experience, recorded by G. G. Rushby, formerly of the Tanganyika Game Department. He was squatting on a low mound one day, with a low bush as cover, watching a slowly moving herd

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of elephants. The elephants were approaching up wind of him, and passed extremely close to his hiding place without becoming alarmed.

The nearest one [he writes] was a cow, who passed within nine or ten feet of me, and with her was a very young calf. The cow stopped a few paces beyond me, and the calf, which was between the cow and myself, walked up the mound towards me and with its very small trunk felt over my chest and face for a few seconds. It then turned and ambled to its mother and blew into her mouth with its trunk, as if trying to convey to her the scent of this strange thing it had found. The cow gave the calf a light cuff with her trunk and started to move on. . . .[20]

Adult elephants are equally inquisitive, although less tolerant of human beings than Rushby's calf, and many hunters and naturalists have nearly come to grief because of this trait. For instance, Sanderson tells how he had a narrow escape when a curious rogue began investigating the tent in which he was asleep one night, and only departed after it had torn a hole in the canvas with its tusks and looked inside.[21]

Elephants live on friendly terms with most of the other creatures of the wild, but occasionally strained relationships develop. Stockley states that they have a strong dislike of the common black rhinoceros.[22] I have never come across any examples of this myself, but it seems very likely that two such large and formidable animals would normally give each other a wide berth. Hippopotamuses sometimes resent having their waters invaded by bathing elephants and are very ready to check them from a distance like small boys. The elephants usually endure these ribaldries with dignified detachment, but if, as occasionally happens, they decide to make a challenging gesture, the offending hippopotamuses will hastily fade away. Most naturalists from Pliny to Buffon have referred to the elephant's dislike of any member of the pig family, but it is extremely doubtful if there is any truth in the belief. Elephants are in general utterly indifferent to the presence of bush pigs, wart-hogs and other swine, although the calves will chase them just as they will chase any other small animal when they are in a mischievous mood.

As has been said, tigers frequently attack Asiatic elephant

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calves, and lions have also been known to attack the African species, but otherwise elephants have little to fear from the larger carnivorous mammals. Snakes are not a serious menace, as their venom is insufficiently strong to kill such a large animal, although it is possible that the occasional calf may die from the bite of a puff adder. Several other creatures are a source of irritation to the elephant, including ticks and other ectoparasites, which fasten themselves to its skin. White egrets have often been seen to perch on the animals' backs and feed on these parasites, but the tick bird or oxpecker (*Buphagus africanus*), which is commonly seen on other large game, does not habitually associate with elephants. Flies use the elephant as a host for their larvæ, laying their eggs in open sores and wounds. When the maggots hatch they feed on the exposed flesh and often cause considerable annoyance; even if their activities are beneficial (see note, p. 50), the elephant can hardly be expected to recognize the fact, and it relieves its irritation by plastering the wounds with mud two or three times a day. Another creature which has been known to cause elephants discomfort is the safari, or driver, ant, (*Dorylus*). Captain Charles Pitman writes:

The 'safari' ant or *siäfu* has been known to get up an elephant's trunk in such quantities as to drive the beast demented; the only remedy is immersion in water. The writer once saw where a big bull had unwittingly acquired a host of these agonising little demons, and in his first frenzy he had twisted and turned on slippery ground in a series of figures of eight—all but coming down several times—in a desperate endeavour to rid himself of his tiny tormentors. Then he made a bee-line, almost at a gallop, for the nearest river, fortunately only a mile away—to indulge in an exceptionally lively bath![23]

Elephants have acquired the reputation of particularly disliking horses and dogs. There seems to be little foundation for the first belief and instances where elephants have charged men on horseback are almost certainly due to their having been disturbed by the human, not the equine, scent. The alleged phobia concerning dogs has a sounder basis in fact, and Tennent recounts an incident in which a Scotch terrier seized the trunk of an elephant, so terrifying it that it came at once to its knees.

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When the dog repeated the attack the elephant retreated in the greatest alarm, holding its trunk above its head, and kicking at the terrier with its fore-feet. Of the general relationship between dogs and elephants Tennent writes: "The truth I apprehend to be that, when they meet, the impudence and impertinence of the dog are offensive to the gravity of the elephant, and incompatible with his love of solitude and noiseless repose." [24] Some dogs, of course, are neither impudent nor impertinent, but anyone who has suffered from the undisciplined yapping of some of the smaller breeds will have considerable sympathy with the elephant's point of view.

Although elephants normally live in herds, solitary specimens are not unknown. These are almost always bulls, usually of exceptionally large size, and inclined to be truculent. Two or three bulls may also associate together completely divorced from female society. Several hypotheses have been put forward to explain this predilection for solitude, none of them entirely satisfactory. The fact that most solitary elephants are large, and therefore aged, bulls suggests that they may have been defeated in battle by some younger bull and driven from the herd. Sanderson discounts this view, and in fact the whole existence of solitary elephants, saying they are always members of a nearby herd who have wandered away for a short time on a foraging expedition, [25] but there is such strong evidence against this assertion that few authorities have been able to agree with him. Other factors that might drive an elephant to solitude would be the decay of its molar teeth, which might cause it to stay in the vicinity of certain soft and easily digestible foods, or some rheumatic or arthritic condition which would prevent it from keeping up with its comrades. Finally, solitude can be simply a matter of choice. There are recluses in the animal world as there are in human societies, and the solitary elephant may be analogous to those human males who, through some physical or psychological aberration, just do not like members of their own kind.

Solitary bulls sometimes become so bad tempered and aggressive that they are commonly known as "rogues". A rogue elephant is an extremely dangerous animal, and will normally attack with great determination and violence as soon as he

becomes aware of an intruder's presence. For some unexplained reason, although the African elephant is less temperamentally reliable than the Asiatic, it is the latter that more commonly turns rogue. It has been estimated that in India alone rogue elephants account for the lives of more than fifty people each year.

The cause of this savagery is unknown, and it certainly cannot be entirely explained as moroseness resulting from the animal's solitary life. Some solitary elephants are not especially bad tempered, and the most crotchety recluse would hardly exhibit the persistent destructiveness characteristic of rogues simply as a result of loneliness. It seems that the typical rogue is either mad, like a homicidal maniac in our own species, or is suffering from some painful wound or disease which sends him berserk. The bodies of rogues have often been found to possess large sores, which must have rendered the animal constantly irritable. Hunters are certainly guilty of creating rogues by wounding their quarry in some place which causes them great pain but is not immediately, or even ultimately, fatal. Toothache resulting from over-strained tusks may be another contributory factor, especially in Africa where the tusks are often very long and heavy and are used by the animal for shifting branches and tearing bark from trees. An elephant on *musth* may also exhibit some of the characteristics of a rogue, but this is only a temporary phase and the causes of its violent behaviour are fundamentally dissimilar.

Many dramatic anecdotes have been told of encounters with rogue elephants. Of these, one of the most typical is that related by Sanderson, concerning a rogue which had taken possession of eight miles of road leading to the village of Kákankoté, some fifty miles from Mysore. At first it did nothing more than alarm travellers by frequently appearing on the road. But then it took to chasing them, and succeeded in killing several natives. It dealt with its victims in a most revolting manner, holding them down with one of its fore-feet, while it tore their legs and arms from their sockets with its trunk and threw them some distance away. Native policemen were stationed at each end of the dangerous stretch of road to warn travellers to proceed only in parties, and men were sent

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with them to beat tom-toms and sound horns until they were safely through.

Sanderson happened to be travelling in the district at the time and decided that the reign of terror must be brought to an end. After an unsuccessful hunt in which he wounded the animal slightly, but nearly lost his own life, the rogue temporarily disappeared. But five months later it was back, its temper apparently by no means improved by the episode. Sanderson decided to try again. He set off into the jungle on Christmas Day 1872 with a small party of native trackers and two gun-bearers. After a long pursuit they came up with the elephant in a dense bamboo thicket. The cover was too thick to be sure of hitting the brain, so Sanderson fired for the heart. As the noise of the report died away, and the smoke drifted through the bamboos, the elephant stood silent for a moment as if stunned. Then with a wild scream it plunged into the jungle. Sanderson reloaded and dashed after it, following a trail of blood which made his hands, face and gun red and sticky as he ran through the grass. About two hundred yards further on he came upon the elephant, which had turned about and was facing him. The animal was a terrible sight. The bullet had penetrated the lungs and blood was gushing from the mouth, so that the chest, fore-legs and trunk were dyed bright red. But the head was held high, the eyes gleamed wickedly, and one fore-foot was planted boldly forward ready to advance. Sanderson raised his rifle and with commendable coolness put a bullet directly between the eyes. The animal dropped instantly and in a few seconds was dead. The hunters found afterwards that the bullet had gone straight through the brain and was embedded fifteen inches deep in the neck muscles behind it. The cause of the elephant's extreme savageness was also discovered. Two-thirds of the tail had been severed in some previous battle or accident, and at the end of the remaining portion was an enormous sore. As the tail at this point was as thick as a man's calf the unfortunate beast must have been enduring great pain. Sanderson marked the successful end of his hunt by severing the head from the body, and placing it by the roadside at Kákankoté as a sign that the rogue was at last destroyed.[26]

Rendered bold by pain or madness, rogue elephants soon

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acquire contempt for mankind. They lose their natural timidity and caution, and make daring raids onto cultivated land. They knock down fences, and even houses, with malicious abandon, and immediately attack any human being who crosses their path. As an example of their boldness Tennent tells how, in broad daylight, a rogue elephant near Ambogommoa watched a gang of labourers at work in a field gathering rice, then boldly walked in amongst them, seized a sheaf, and retired with it leisurely to the jungle.[27] The fear of rogue elephants has even on occasion caused them to be branded as man-eaters. Thus an elephant which terrorized the district around Mandla, near Jubbulpore, in the Central Provinces of India in the early 1870's was reputed to have eaten parts of its numberless victims. This was, of course, nonsense, as elephants are exclusively vegetarian in diet, but the superstition probably arose from the animal's habit of playing with the limbs of dismembered natives, and holding them in its mouth. This elephant was eventually shot by two European officers.

Reports of man-eating elephants show how easily a cloud of superstition can gather around these awe-inspiring creatures, and distort the true facts. Another popular myth that was believed for many years was that aged elephants went to a communal "cemetery" in some remote spot to die. It is certainly true that large numbers of elephant skulls are sometimes found in one place (for example, in Karamojo in eastern Uganda), but the explanation is not that these regions represent some mysterious elephantine Kensal Green. Poisoned water supplies or virulent epidemics of anthrax are a much more likely explanation; so is the cruel native hunting technique of ringing a herd of elephants with fire, causing the death of many of its members from suffocation or burns.

But not every unlikely story concerning elephants can be dismissed as idle superstition. For example, the tradition that they will help one another in difficulties, and that the herd is loth to desert one of its members who is injured or wounded, is well substantiated. Commander Blunt tells how he was called one evening to an African village where elephants had been continually raiding. He went at once in search of the miscreants and soon came across a party of four bulls. He fired at the brain

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of one of them and missed, but the elephant nevertheless went down. Blunt continues:

Immediately the three others closed in on him, one on either side and one behind, and they just boosted him on to his feet and, in that formation, supporting him on either side, set off, wheeling gradually round to the left and back to the forest. That was the first time I had seen such a thing, and I stood amazed. It was fast getting dark so I returned to camp, and next morning went after the wounded one, but I do not think he was badly hurt as I never came up with any of them.[28]

Emerson Tennent reported similar occurrences in Ceylon[29] and both Captain Pitman and G. G. Rushby quote examples of elephant altruism in East Africa. Pitman states that most of the recorded cases concern the efforts of cows to help a stricken bull. He has also heard of bulls helping another bull, but has only one record of other elephants trying to help a stricken cow.[30]

Rushby's story is particularly touching, and describes how two calves helped a half-grown bull. He was out on elephant control work in the Morogoro District of Tanganyika, when he came across three full-grown cows and a half-grown bull in long grass. His control work demanded that he should shoot the cows, which he reluctantly did. He also slightly wounded the half-grown bull. Only then did he discover to his horror that two of the cows had been accompanied by calves, which were invisible in the long grass. He walked towards the three animals, shouting and waving his hat in an attempt to drive them back to the main herd, about a mile away, where the calves would find foster-mothers. The half-grown bull was still confused by the shot, and did not know what to do. But instead of deserting it the two calves promptly ranged themselves one behind and one alongside their dazed companion, and helped him along exactly as adult elephants would have done in a similar emergency.[31] Although, as Rushby commented, it is possible that this was an instinctive trait and not a thought-out action, I think we may fairly give the calves full credit for their unselfishness. Their behaviour was typical of the courage and affection shown by nearly all elephants when their comrades are in distress.

CHAPTER FIVE

The Elephant's Living Relations

IN THE FOREGOING CHAPTERS I have briefly summarized our knowledge of the living elephants of the world. Before going on in Part 2 to the story of their origin and evolution it is now necessary to give a short account of their nearest living relations. This knowledge may help us to understand the workings of the evolutionary process, and will certainly underline the divergences that can take place from an ancestral stock in what, from a geological point of view, is a very short space of time.

If we were asked to suggest the names of living animals that looked as though they might be closely related to elephants we might fall very easily into a number of elementary traps. For instance, we might name the rhinoceros and hippopotamus because they are large and thick-skinned, or the tapir because it has a rudimentary proboscis, or trunk. We would be wrong in so doing, but we should not need to be ashamed of our mistake. As stated in Chapter One, no less a person than Cuvier himself was prepared to accept this natural division and, with his compatriot Geoffroy-Saint-Hilaire, even produced the name *Pachydermata* to identify it.

But the principles of classification have now been fundamentally changed, and family relationships are found to depend not on visual resemblances, which are often superficial and misleading, but on the far more reliable testimony of anatomy—and particularly the anatomy of the bones and teeth. Thus because two animals are large, four-legged, small-eyed, and thick-skinned, or share certain other characteristics in common, such as hoofs, or hairless tails or trunk-like noses, this does not mean they are closely related. In fact, either animal may be much more akin to one which superficially does not resemble it at all. Although this may sound odd, it will seem less so when

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we remember that even different varieties of the same species often show astonishing variations. For example, supposing we were asked to describe a typical specimen of *Canis domesticus*, the common domestic dog. Would we describe a pug, a corgi, a borzoi, a spaniel, or a St. Bernard? Yet all these animals are considerably more closely related to one another than, say, a corgi and a fox, which have such a strong superficial resemblance.

The creatures that are now recognized as the elephants' next of kin do not, in fact, have any apparent resemblance to them. They belong to two orders, known as the Hyracoidea and the Sirenia, which are placed with the Proboscidea and an extinct order known as the Embrithopoda in a loosely associated group known as the subungulates. The Hyracoidea, or hyraxes, are small and furry with a superficial resemblance to large tailless rats or guinea-pigs. The Sirenia, or sea-cows, are aquatic mammals whose peculiar anatomy has sometimes caused them to be mistaken by the credulous for mermaids. Yet, when compared with the Proboscidea, both these unlikely groups show deep-seated affinities in structure. We will discuss these affinities shortly, but in the meantime let us look more closely at the members of the two orders.

There are over a dozen species and subspecies of hyrax, all belonging to a single family, the Procaviidæ. Three genera are recognized within the family, with the scientific names of Procavia, Heterohyrax and Dendrohyrax; members of the first two genera are known as rock hyraxes, and of the last as tree hyraxes. None of the genera is found outside Africa, Arabia, and Syria.

Hyraxes are alert, energetic little animals, plump and thick-set, with pointed muzzles and small, rounded ears. An average specimen is about the size of a rabbit, but there is some variation between the different species. Other characters determining specific rank are habitat, colour, and length of fur. For example, the Syrian, or Arabian, hyrax (*Procavia capensis*)—which formerly enjoyed, incidentally, the delightful scientific name of *Hyrax semicircularis*—is dark sepia brown with soft, fine fur of medium length; the Nubian hyrax (*Procavia ruficeps*), on the other hand, is sandy fawn in colour, grizzled with black,

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and has long but rather harsh fur. Equally wide variations distinguish some of the other species.

The rock hyraxes are better known than the tree hyraxes, being partly diurnal in habits and therefore more easily seen. They live in colonies of from thirty to sixty individuals, usually in rocky districts, at anything from sea-level to over 10,000 feet. They make their homes in holes beneath the rocks, but they do not burrow like rabbits as their feet are ill adapted for this purpose. When playing or feeding round their homes they are very



A rock hyrax

quick and agile in their movements, darting hither and thither and occasionally fighting and bickering among themselves. During such expeditions above ground they have a habit of posting a sentinel, usually one of the older males of the community, who gives immediate warning should danger threaten. Dr. W. T. Blanford in his *Observations on the Geology and Zoology of Abyssinia* says there is little difference between the habits of the different African species. He writes:

They appear to feed at night and very early in the morning, their principal food being the leaves and young shoots of trees and bushes. In the stomach I invariably found a green mass too much crushed for the separate leaves to be distinguished. During the day they lie out upon rocks in the shade, or retire, especially towards midday, beneath the rocks. They are timid and wary, rushing into their holes at the smallest intimation of danger. The only sound I heard made by them was a shrill squeak when suddenly alarmed. They can climb over smooth surfaces of rock in a wonderful manner, their large flat feet aiding them in obtaining a hold.[32]

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Rock hyraxes were well known in Biblical times, and there are references to them in Leviticus, Deuteronomy, Psalms, and Proverbs. Their name in Hebrew was *shaphan*, meaning "the hiding one", but the translators of the Authorized Version unfortunately rendered the word as "coney", or rabbit. This was most misleading, as except for its habit of making a home underground the hyrax differs from the rabbit in nearly every way. But the correct identification of the *shaphan* as the hyrax is made clear by several passages of scripture. For example, in Psalm 104, verse 18, we read: "The high hills are a refuge for the wild goats; and the rocks for the conies"; and again in Proverbs, Chapter 30, verse 26: "The conies are but a feeble folk, yet make they their homes in the rocks." In some passages the Bible even correctly suggests that the hyrax has affinities with the ungulates, or hoofed mammals. Thus in Leviticus, Chapter 11, verse 5, it is written: "And the coney, because he cheweth the cud, but divideth not the hoof; he is unclean unto you." This is bad science, of course, because the hyrax is not a ruminant; but it does suggest that the Biblical writers were well aware of the unusual character of the animal as compared with rabbits and other rodents.

The tree hyrax (genus *Dendrohyrax*) differs somewhat from the rock hyrax in appearance and, as its name implies, occupies a different habitat. Three species are recognized: *Dendrohyrax dorsalis* from the great rain forests of West Africa and the Congo; *Dendrohyrax validus* from southern Kenya, Tanganyika (especially the slopes of Kilimanjaro), Zanzibar, and the neighbouring islands; and *Dendrohyrax arboreus*, from a vast territory extending from the Cape to north of Mount Kenya, but not west of the longitude of Lake Tanganyika. All these species mainly inhabit forest areas, although they are also found in wooded savannah provided there are sufficient trees. They are arboreal and nocturnal, and do not live in colonies like the rock hyrax. They nest in holes in trees, producing from one to three young, and in spite of their thick-set bodies and short legs can move about the branches with great agility. Their fur is longer than that of the rock hyrax, and their feet are specially adapted for arboreal life. They are also very noisy, and their howling cry is one of the characteristic sounds of the African night. It is made only by

the males, and the performance may last from sunset until two or three o'clock in the morning.

Now what of the relationship between the hyraxes and the elephants? So far such likenesses as have been noticed—for instance, the vegetable diet, the communal habits of the rock hyrax, the wide tolerance of climate and altitude, the excessive timidity—have been entirely superficial, and it would be both rash and misleading to regard these characteristics as having any biological significance. As stated earlier, the valid evidence of relationship is based upon subtler and more reliable criteria, and particularly on similarities of skeletal anatomy. Here indeed there are some interesting parallels between the two animals.

The most important evidence of relationship comes from the structure of the legs and feet. The similarities can only be proved by the use of technical terminology, which would be out of place in a book of this kind, so I must ask the reader to accept the evidence largely on trust. But briefly and simply put, the similarities depend on such things as the length of the upper limb bones, the partial crossing of the bones of the fore-limbs, known as the radius and ulna, the short digits, or "fingers", and the flattening of the bones, known as the carpal bones, lying just below the wrist. A more obvious likeness is the hoof-like nature of the hyrax foot, which has four nail-like processes on the fore-foot and three on the hind. There are several other skeletal similarities—for example, the large number of dorsal vertebræ, and the width of their solid underparts, or centra. In addition most tree hyraxes have only two mammæ, or breasts, situated, like the elephant's, close behind the fore-limbs. Anatomical features such as these are sufficient to prove to scientists that elephants and hyraxes must have had a common ancestor at some comparatively recent period in geological time.

The Sirenia, or sea-cows, which are the second group of living animals known to be related to the elephants, are superficially even more unlike them than the hyraxes. There are only two living genera, the dugong (*Halicore*) and the manatee (*Trichechus*), the first containing two species, the second three; a third genus, *Rhytina*, represented by the huge animal known as Steller's sea-cow (*Rhytina stelleri*), was exterminated by human



7 a) A large tusker at sunset beneath Kilimanjaro

b) Elephant tracks near Namanga, Kenya





8 a) Motoring hazards in Africa

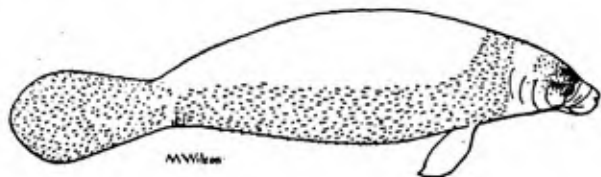
b) A herd of African elephants from the air, Caprivi Strip, South Africa



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agency rather more than a century ago. The order received its name of Sirenia, or sirens, because of the long association of sea-cows with the mermaid legend. In early times, when sea voyages took more time than they do today and the dubious amenities of modern ports were largely lacking, love-starved mariners were apparently ready to identify the unalluring shapes of sea-cows with the romantic images of their dreams. I have dealt with this subject fully in my book *Mermaids and Mastodons*, so I will not enlarge on it here; it will suffice to say that no animals could have been more miscast for such a glamorous role.

The manatees are aquatic mammals found in the rivers and estuaries of the tropical shores of the Atlantic Ocean. They are about 8 feet long, slate-grey in colour, and when adult are almost hairless. The body is torpedo-shaped, tapering in front



A manatee

to a round head with small eyes, and at the rear to a rounded, horizontally flattened tail. The hind-limbs are absent, and the fore-limbs consist of two paddle-like flippers which the manatees use for swimming and for heaving themselves about in the shallows. They are timid, inoffensive creatures, who live by browsing on water-weeds and other aquatic vegetation, which they tear from the bottom with their cleft, muscular upper lips. If removed from their element they are quite helpless, and they never voluntarily leave the water, even to breed.

The dugong superficially resembles the manatee in appearance and habits. The main external difference is that the tail, instead of being rounded, is expanded horizontally into flukes. The animal inhabits the coasts of the west Pacific and Indian oceans for about 15° north and south of the equator, and was formerly very common. But commercial exploitation, especially in Australia in the nineteenth century, when its oil was

much sought after for medicinal purposes, led to a drastic reduction in its numbers. It is still frequently killed by the Malays, who relish its tender pork-like flesh, and regard the congealed mucous secretion of its eyelids as a potent aphrodisiac. Like the manatee, it is timid and gentle by nature, and is thus an easy victim for the hunter. Although the animal is now officially protected there is still, I feel, some danger that it may die out altogether. When I was at the Egyptian Marine Biological Station at Al Ghardaqa on the Red Sea in 1955 I learnt that dugongs were once commonly seen there, but that now not a single specimen had been sighted for over two years.

The relationship of the sea-cows to the elephant is proved by a number of similarities not only in their bones and teeth but also in their general anatomy. These likenesses were first spotted by the French zoologist and physician Henri Marie Ducrotay de Blainville (1777-1850), and the theory of relationship has been much strengthened by later researches into living and fossil forms. Some of the most remarkable points of resemblance are the possession by the sea-cows of abdominal testes, a pair of breasts placed, like the elephant's, close to the fore-limbs, and a double apex to the heart. The anatomy and growth of the teeth is also significant. The male dugong, for example, carries tusks, which, like the elephant's, are simply large incisors and grow continuously throughout the animal's life. Also both manatees and dugongs, although differing in the number of their molar teeth, resemble the elephant in the way the molars migrate forward along the length of the jaw. Thus the manatee during its lifetime has up to twenty teeth in each half of the upper and lower jaws; these are not all in position at the same time, but are replaced from behind as the front teeth are shed or absorbed. A similar process occurs in the dugong, although with a reduced complement of teeth.

There are numerous other anatomical likenesses between the sea-cows and the elephants, but a detailed catalogue of such technical minutæ would be tedious for the lay reader. I hope I have said enough to show that the relationships of animals are often subtler, more interesting and more surprising than they appear to be on the surface. It is obvious that deep-seated processes have been at work, selecting and modifying the members

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of a single species, until they eventually diverge and follow quite separate evolutionary paths. In the next part of this book, when we shall look at some of the ancestors and extinct relations of the living elephants, we shall perhaps gain some idea of how these processes have worked through the long ages of geological time.



PART 2

Elephants
as
Fossils



CHAPTER SIX

The Place of the Elephants in Geological Time

TO UNDERSTAND the family tree of the elephants and their relations it will first be necessary to place them in the perspective of geological time. I have dealt with the geological past of the Earth, and the way the fossilized remains of animals have enabled us to interpret the history of life, in my book *A Guide to Earth History* to which the interested reader is referred. Here it will only be possible to paint the picture with the broadest brush-strokes, restricting ourselves mainly to the era when the elephants went through the various stages of their evolution.

The Earth is now believed to be over 3,000 million years old, and to have been the home of living things only for about a third of this immense span of time. The last thousand million years has seen the gradual evolution of organisms from their probable point of origin as a chemical reaction on the intertidal beaches, through increasingly complex phases of growth, to the present day. During this time a tremendous differentiation of life-forms has taken place, so that the Earth today is inhabited by organisms as dissimilar as the filter-passing viruses and the great elephants themselves, and life has established itself in every environment from the highest mountain-tops to the deepest abysses of the sea.

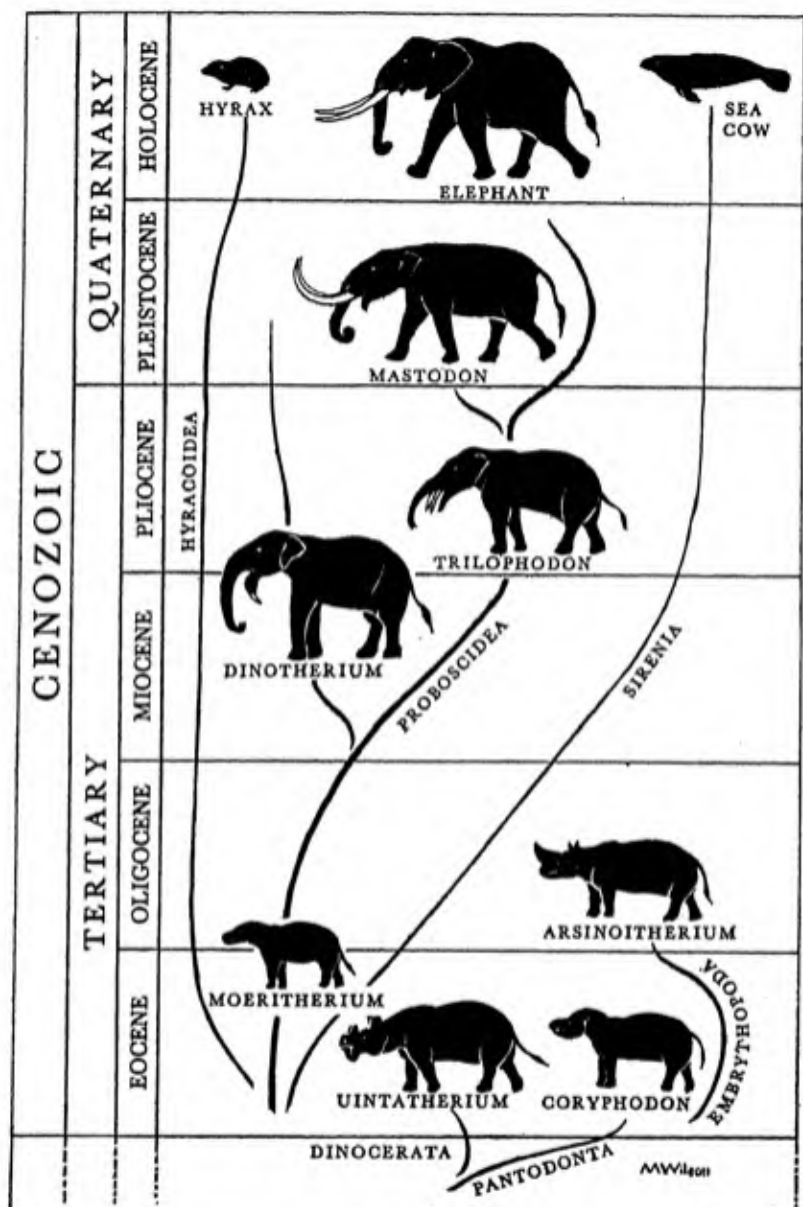
For the sake of convenience, the time occupied by this extraordinary development is divided by scientists into a number of distinct eras based partly on geological criteria and partly on the rise to domination of different groups of animals. Thus the first great era, lasting from the dawn of life until about 520 million years ago, is known as the Proterozoic, or era of earliest life; the second, lasting from about 520 million until about

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195 million years ago, as the Palæozoic, or era of ancient life; the third, lasting from about 195 million until about 70 million years ago, as the Mesozoic, or era of intermediate life; and the fourth, lasting from about 70 million years ago until the present day, as the Cenozoic, or era of recent life. The Proterozoic was mainly characterized by small soft-bodied organisms that have left hardly any fossil remains; the Palæozoic by invertebrates, fishes, amphibia, and the earliest land reptiles; the Mesozoic by the great reptiles of land, water and air, and particularly by the dinosaurs; and the Cenozoic by the mammals, among whose ranks are numbered all the familiar land animals of today, not excepting man himself. It is only the Cenozoic, and perhaps the very last phase of the Mesozoic, that are relevant to the geological history of the elephant group.

In the chart on the opposite page is shown the chronology of this most recent age in the development of life. It will be seen that the Cenozoic, in which the origin, radiation, and decline of the elephants and their relations took place, is divided into two main periods, the Tertiary and Quaternary, and that these in turn are subdivided into a number of epochs. The terms Tertiary and Quaternary, incidentally, are survivals of an earlier system of Earth chronology, based on the division of geological time into four periods; the names have no other significance, and need not be discussed. But the reader will probably like to know the meaning of the names of the epochs, which are as follows: Eocene, "dawn of the recent"; Oligocene, "few of the recent"; Miocene, "less recent"; Pliocene, "more recent"; Pleistocene, "most recent"; and Holocene, "wholly recent". A seventh epoch, called the Palæocene, or "ancient dawn of the recent", is sometimes recognized as a period of transition between the Mesozoic and the Eocene, but as this is not a universal practice it has here been omitted.

At the end of the Mesozoic Era, for reasons which scientists still cannot fully explain, the great reptiles which had dominated the Earth for over 120 million years suddenly became extinct. The modern crocodiles, tortoises, turtles, snakes, and lizards are the only survivors of this once-powerful class of animals. But the disaster that overtook the reptiles gave the mammals a long-awaited opportunity, and at the dawn of the



Divisions of the Cenozoic era, showing the place of the Proboscidea in geological time. The divisions are not to chronological scale. After Colbert (1955) and Carrington (1956)

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Eocene there was a great radiation of mammalian types. It will, I think, add to the interest of the story of elephant evolution if it is preceded by a brief account of the origin and early development of the mammals.

The mammals evolved from the reptiles, and it is therefore first necessary to define how the two kinds of animals are distinguished. An obvious superficial difference is that most reptiles have scales and most mammals have fur. This is fairly acceptable as far as it goes, but like all superficial criteria it is not reliable in every case. One has only to think of the tortoise, a reptile which has a shell instead of scales, and the pangolin, a mammal which has scales instead of fur. A more scientifically accurate distinction would be that reptiles are "cold-blooded" and mammals are "warm-blooded"; that is to say, the reptile's temperature varies with that of its environment, while the mammal has a heat-regulating mechanism which keeps its temperature more or less stable. Another reliable distinction would be based on the behaviour of the two groups in relation to their young. Thus reptiles, which produce either eggs or living young, thereafter abandon them to their fate, whereas mammals have a mechanism for suckling the young after birth and a social structure which protects them in the early stages of their development. More technical criteria would be that reptile limbs are not so suited to four-legged progression as those of most mammals, and that there are differences in the structure of the jaws and teeth, and the way the skull articulates with the neck. There is also a particularly significant difference in the size of the cranium, which in the mammals is greatly enlarged to accommodate a larger brain with greatly increased cerebral powers.

Reptiles that were already beginning to show certain mammalian characteristics existed quite early in the Mesozoic Era, and in fact at the end of the preceding Palæozoic. Examples of these are the extraordinary fin-backed reptile *Dimetrodon*, which lived in Texas over 200 million years ago, and the somewhat later *Kannemeyeria* and *Cynognathus*, which, if not in the direct line of mammalian descent, were at least close to the main stem. The exact reptilian group from which the mammals were derived is unknown, but it is reasonably certain that all mam-

PLACE OF ELEPHANTS IN GEOLOGICAL TIME

mals, living and extinct, had a common point of origin. This provokes the interesting, and perhaps salutary, reflection that all the existing species of mammals, including elephants and men, are blood relations, sharing a common ancestor at a remote period in geological time.

The first true mammals of which we have any fossil remains appeared about 170 million years ago. They were for the most part small and insignificant, as indeed they had to be to keep out of the way of the great carnivorous dinosaurs who were still to dominate the Earth for another 100 million years. As the Mesozoic advanced the fossil evidence indicates that the main mammalian stem had already split into a number of different branches. For instance, even before the middle of the era, four mammalian orders can be distinguished among the fossil remains discovered in Europe and the United States. Three of these later became extinct, but scientists believe that the fourth, known as the Pantotheria, was probably the starting-point of mammalian evolution. The pantotheres were unimpressive little animals with long, slender jaws and a large array of cheek teeth. They were probably insectivorous and in appearance somewhat resembled modern opossums. It is curious to think that animals such as these are probably ancestors of all the mammals alive today, and can thus number among their progeny the minds that produced the plays of Shakespeare, the symphonies of Beethoven, and the paintings of Michelangelo.

By the end of the Mesozoic the descendants of the pantotheres had already diverged into a number of groups ancestral to the modern mammals. The fossil evidence is scanty, and it is difficult at this stage to trace the different lines of mammalian descent with any degree of certainty. However, it seems probable that our own ancestors at this time were small arboreal insect-eaters not unlike the modern tree shrews, and that contemporary mammalian groups were already developing the specializations of structure and behaviour that were to lead to the different orders of mammals of the modern world.

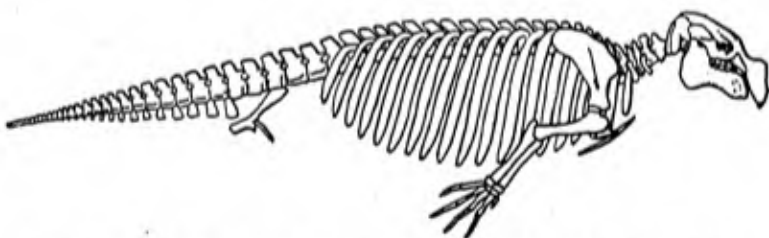
Now what is the earliest point to which we can trace back the development of the elephant group? Strictly speaking we can go no further than the Eocene, which saw the appearance of a small ancestral elephant known as *Mærittherium*. This animal,

ELEPHANTS AS FOSSILS

and the other early members of the order Proboscidea, will be described in the next chapter. But before thus restricting the field a brief word must be said about some of *Maritherium's* contemporaries and immediate predecessors that are believed to have certain affinities with the proboscidean stem.

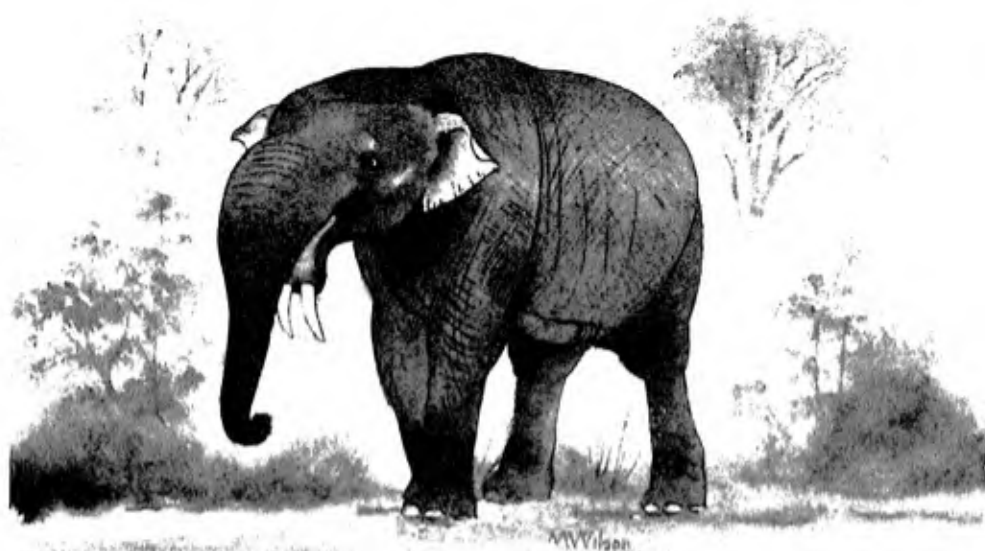
I have already shown in the previous chapter that the elephant group is closely related to the hyraxes and the sea-cows. It seems likely that the ancestral stem split into three at the beginning of the Eocene, as is shown on the chart on page 97. One branch, of which *Maritherium* is the earliest example so far discovered, gave rise to the elephants and their nearest relations, known as dinotheres and mastodons; the second branch led to the modern hyraxes; the third to the sea-cows. This line of thought is confirmed by the fact that fossil remains of hyraxes and sea-cows that have survived from Eocene times show even greater affinities with the ancestral elephants than do their modern successors with the elephants of today.

The ancestral sea-cows and hyraxes seem to have originated in Africa, and are represented by a large number of fossil forms.



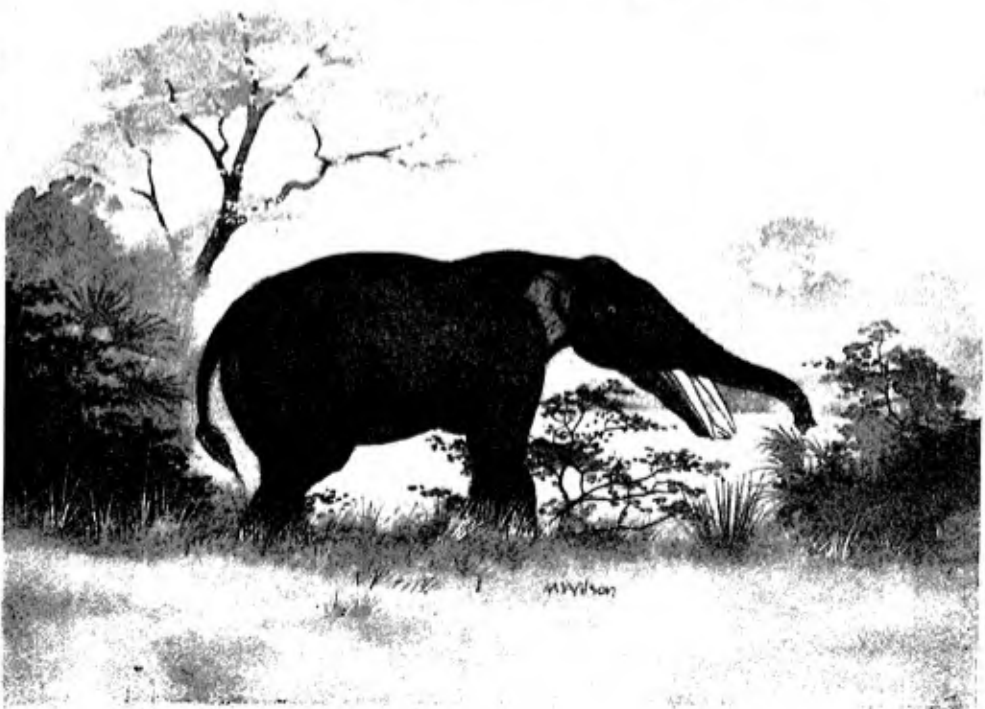
Skeleton of the Oligocene sea-cow *Halitherium*. From Romer (1945)

One of the earliest sea-cows, called *Eosiren*, showed many characteristics, such as a beaked head and rudimentary tusks, which can still be seen in the dugongs of today. Typical of later transitional forms was the Oligocene sea-cow *Halitherium*, whose skeleton is depicted in the figure above. Some of the hyraxes were much larger than their modern successors; for instance, *Megalohyrax* of the Oligocene was the size of a small pony. But these giant hyraxes eventually became extinct, and the line



1) a) *Dinotherium giganteum*. Reconstruction by Maurice Wilson

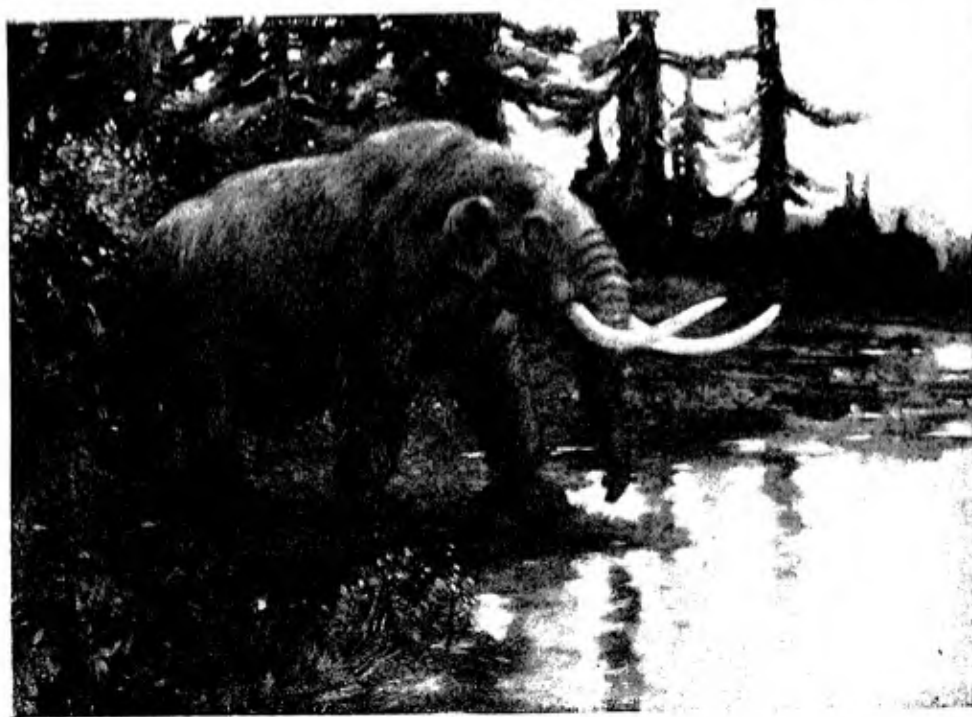
b) *Trilophodon angustidens*. Reconstruction by Maurice Wilson





10 a) The shovel-tusker *Platybelodon grangeri*. Reconstruction by Maurice Wilson

b) The American mastodon *Mastodon americanus*. Reconstruction by Charles R. Knight



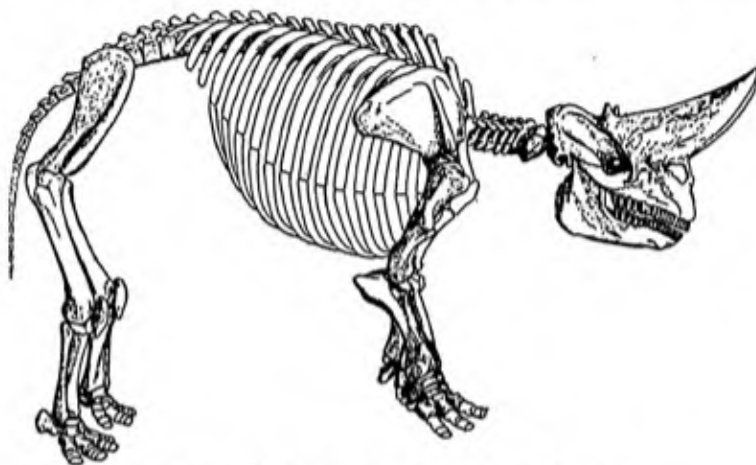
was carried on by the small rabbit-like creatures that culminated in the modern *Procavia*.

Apart from these closest relations of the ancestral elephants there were some extremely interesting creatures somewhat further removed from the main stem. The two most important orders are known to scientists as the Pantodonta, or amblypods, and the Dinocerata, or uintatheres. The name amblypod, incidentally, means "blunt foot", which is self-explanatory, and the name uintathere means "Uinta beast", after the Uinta mountains in Utah, U.S.A., where the fossil remains of these creatures were first discovered. The most typical member of the Dinocerata was *Uintatherium*, which lived in North America in the later part of the Eocene Epoch, some 50 million years ago. It was about the size of a modern African rhinoceros, and was grotesquely ornamented with pairs of horn-like bony swellings on the roof of its long, low skull. Although a member of a distinct order, it is interesting to see how its great size and weight demanded a structure and proportion in the limbs that is strongly reminiscent of the later species of elephant. The feet were also short and stubby as in the elephant, and possessed the same semi-plantigrade form, with a fleshy cushion enclosing the bones. Of the amblypods the best known example is *Coryphodon* from the Lower Eocene of Europe and North America. This animal was about eight feet long and was characterized by a large skull with big canine teeth, a broad muzzle, and a long, slender tail. Its limbs showed similar adaptations to those of *Uintatherium* in order to help it support its considerable bulk.

Only one more creature remains to be discussed before we embark on a closer inspection of the proboscideans themselves. This is the astonishing animal known as *Arsinoitherium*, which, although a very distant cousin indeed of the elephants, does show a number of features suggesting a common origin. The fossil remains of *Arsinoitherium* were found in Egypt, and it was named by its discoverer, H. J. L. Beadnell, in honour of Queen Arsinoë, the wife of Ptolemy II, whose ruined palace stood near the site. The animal, which lived in Oligocene times some 40 million years ago, measured over eleven feet from nose to tail, and was distinguished by a massive pair of horns, fused at the base, rising from the nasal bones. The head was attached

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to the body by a short, thick neck rather like that of the elephants, and a somewhat stronger likeness was apparent in the anatomy of the fore-feet. Dr. C. W. Andrews of the British Museum (Natural History) who first described the animal, wrote: "The muzzle was very narrow, so that probably the animal did not graze, but browsed on low bushes and herbage,



Skeleton of *Arsinoitherium*. From Romer (1945)

grasping its food by means of a prehensile tongue or possibly of a mobile upper lip." He also deduced from the teeth and from certain resemblances in the structure of the skull that *Arsinoitherium* had affinities with the hyraxes.[33] In spite of these similarities, however, it was clear that the manifold differences were at least equally important, and it would therefore have been impossible to place the animal in any existing group. As a result it was necessary to create a new order specially to contain *Arsinoitherium*—the Embrithopoda, or "heavy-footed ones". And there, in melancholy isolation, the grotesque beast of Queen Arsinoë will have to remain until new discoveries of fossil bones enable its place in the tree of life to be more certainly known.

CHAPTER SEVEN

The First Proboscideans

BEFORE EMBARKING on a description of the first proboscideans to appear in the fossil record it will be necessary to say a few more words on the subject of classification. As I mentioned in Chapter One, the order Proboscidea contains no less than 352 different species, most of which were described and figured by the late Professor Fairfield Osborn in his famous monograph. They ranged from the two living forms and their nearest extinct relations, the mammoths, to a number of bizarre and primitive species that hardly looked like elephants at all. Osborn worked out an extremely complicated system of relationships in an attempt to reduce this vast array of animals to some sort of order, but even with his great knowledge and experience the attempt was only partly successful. In a popular book of this kind I shall not even attempt to give a comprehensive classification; my object will be rather to provide a few pigeon-holes in which the species described can be conveniently docketed. Even this will involve introducing several rather formidable scientific names, but I hope the reader will share my own feeling that these have a romantic flavour of their own which makes them well worth mastering.

As can be seen from the chart of the Elephant's Family Tree on page 105, the order Proboscidea is divided into three main branches or suborders. These are the *Mœritherioidea*, or *mœritheres* (named after the ancient Lake Mœris in Egypt where their remains were first discovered); the *Dinotherioidea*, or *dinotheres* (from two Greek words meaning "huge beasts"); and the *Elephantoidea*, or "elephant-like ones". A fourth branch, the *Barytherioidea*, or "weighty beasts", is somewhat doubtfully associated with the proboscideans, and therefore is not shown on the chart. Of the three suborders, the *Mœritherioidea*

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and the Dinotherioidea are each represented by a single genus only; but the third suborder, the Elephantioidea, contains a large number of genera and is itself subdivided into three smaller branches, or families, to contain them. The names of these families are the Gomphotheriidae, the Mastodontidae, and the Elephantidae, or true elephants. It will also be seen from the chart that two families (known as the Mœritheriidae and the Dinotheriidae) are inserted into the hierarchy of the mœritheres and dinotheres respectively, but as only one genus is involved in each case, these are simply placed there to keep the classification consistent, and to satisfy the tidy minds of taxonomists. This is all that need be said about the proboscidean family tree. I do not propose to bore the non-specialist reader by making constant reference to it, but I hope the chart may help those who are interested to gain a clearer picture of the way the more important genera are related. Likewise the Table of Elephant History which accompanies the chart (p. 106) is designed to show at a glance when and where the different kinds of fossil proboscideans lived.

The most primitive proboscidean whose fossil bones have so far been found is the little animal known as *Mœritherium*, which was briefly referred to in the previous chapter. But although earliest in point of time, it was not discovered until much later than many more recent forms. The story begins in 1879 when the German traveller Georg Schweinfurth was searching for fossils in the Fayûm province of Egypt. This region lies in a depression in the desert to the west of the Nile valley some 57 miles south of Cairo. In the centre of the depression lies the lake which was known to the ancients as Lake Mœris and to the modern Arabs as the Birket el Kerûn. Today the lake measures some 25 miles long by 6 miles wide, but it was formerly much larger, and was used by the ancient Egyptians as a regulator to control the waters of the Nile. Around the lake are a number of geological formations belonging to different epochs of the Cenozoic era, particularly Eocene and Oligocene strata dating from over 35 million years ago. The arrangement of these strata in the form of a series of easily accessible terraces and escarpments makes the region a happy hunting-ground for the fossil collector.

Schweinfurth's efforts were soon rewarded with success. On

THE ELEPHANT'S FAMILY TREE

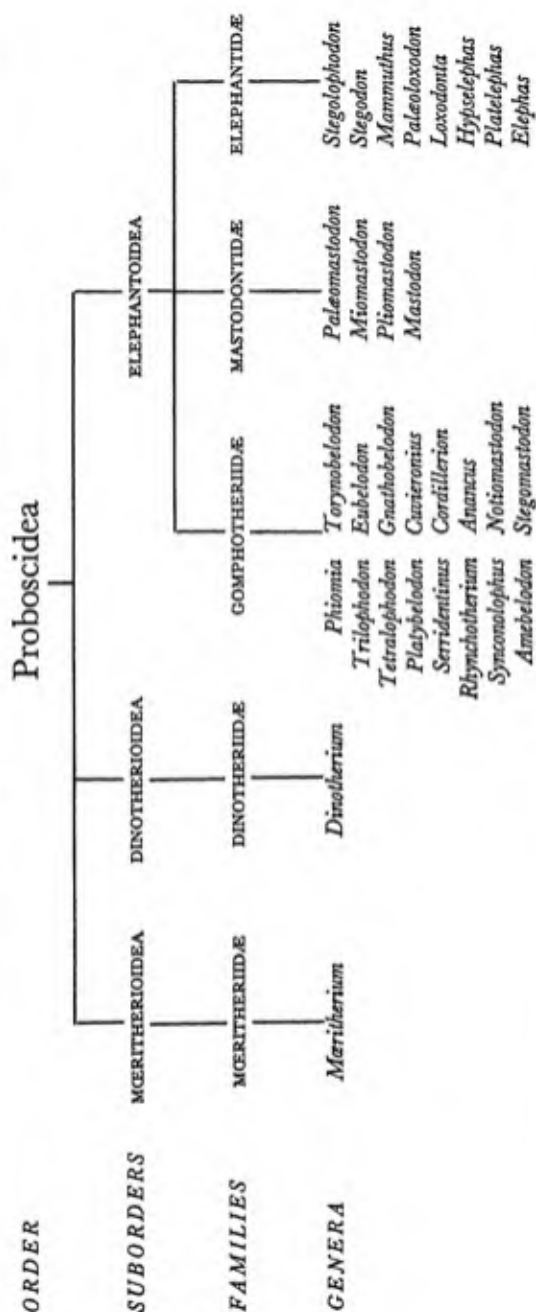


TABLE OF ELEPHANT HISTORY

EPOCH		YEARS AGO	MAIN PROBOSCIDEAN GENERA THEN ALIVE
HOLOCENE		10,000	<i>Loxodonta</i> (Af.), <i>Elephas</i> (As.)
	PLEISTOCENE	1,000,000	<i>Dinotherium</i> (Af.), <i>Rhynchotherium</i> (N.A.), <i>Cuvierius</i> (S.A.), <i>Cordillerion</i> (S.A.), <i>Anancus</i> (Eur., As.), <i>Notiomastodon</i> (S.A.), <i>Stegomastodon</i> (N.A., S.A.), <i>Mastodon</i> (N.A.), <i>Stegolophodon</i> (As.), <i>Stegodon</i> (As., Af.), <i>Mammuthus</i> (Eur., As., Af., N.A.), <i>Paleoloxodon</i> (Eur., As., Af.), <i>Loxodonta</i> (Eur., As., Af.), <i>Hypselophus</i> (As.), <i>Platelephas</i> (As.), <i>Elephas</i> (As.)
PLIOCENE		15,000,000	<i>Dinotherium</i> (Eur., As., Af.), <i>Trilophodon</i> (Eur., As., N.A.), <i>Tetralophodon</i> (Eur., As., N.A.), <i>Platybelodon</i> (N.A.), <i>Serridentinus</i> (As., N.A.), <i>Rhynchotherium</i> (As., N.A.), <i>Synconolophus</i> (As.), <i>Amelbelodon</i> (N.A.), <i>Torynobelodon</i> (N.A.), <i>Eubelodon</i> (N.A.), <i>Gnathobelodon</i> (N.A.), <i>Cuvierius</i> (N.A.), <i>Cordillerion</i> (N.A.), <i>Anancus</i> (Eur., As.), <i>Pliomastodon</i> (Eur., As., N.A.), <i>Stegolophodon</i> (Eur., As.), <i>Stegodon</i> (As.)
	MIOCENE	35,000,000	<i>Dinotherium</i> (Eur., As., Af.), <i>Trilophodon</i> (Eur., As., Af., N.A.), <i>Tetralophodon</i> (As., N.A.), <i>Platybelodon</i> (As., N.A.), <i>Serridentinus</i> (Eur., As., N.A.), <i>Rhynchotherium</i> (Af., N.A.), <i>Synconolophus</i> (As.), <i>Miomastodon</i> (Eur., Af., N.A.).
OLIGOCENE		45,000,000	<i>Meritherium</i> (Af.), <i>Phiomia</i> (Af.), <i>Paleomastodon</i> (Af.).
	EOCENE	70,000,000	<i>Meritherium</i> (Af.).

Key to abbreviations: Eur.: Europe; As.: Asia; Af.: Africa; N.A.: North America; S.A.: South America.
N.B. The divisions representing the Epochs are not to chronological scale.

THE FIRST PROBOSCIDEANS

an island known as the Geziret el Kerûn towards the eastern end of the lake he discovered interesting specimens of fossil fish and of the extinct genus of whales known as *Zeuglodon*. He returned again in the winter of 1885-6 and carried off another consignment of bones from the escarpments on the north side of the lake. Although no elephant fossils were collected on either of these expeditions, Schweinfurth's efforts were largely responsible for awakening the British authorities to a somewhat belated feeling of interest. Even then, however, it was not until 1898 that H. J. L. Beadnell of the Egyptian Survey Department was authorized to make a detailed investigation of the area. At first nothing of particular interest was obtained, but three years later Beadnell returned to the site with Dr. Charles Andrews of the British Museum (Natural History) and, during a number of winter expeditions between 1901 and 1904, an extremely important collection of fossils was brought to light. These included the remains of the ancient sea-cow *Eosiren*, the extraordinary beast *Arsinoitherium* described in the previous chapter, and three genera of fossil proboscideans, including *Mærittherium*.

The reader will see from the reconstruction of *Mærittherium* on page 108 that it bore no external resemblance to the species of elephants alive today. It was comparatively small, measuring no more than 2 feet high at the shoulder, and it did not even possess the characteristic trunk. But in the structure of the skull, and particularly of the teeth, it quickly gave away its proboscidean status. For instance, the second pair of incisors in the upper jaw was much enlarged, showing that the formation of tusks had already begun; small tusks were likewise present in the lower jaw, a condition which was common in many of the later proboscideans. There were also signs of the air cells in the skull that are so typical of modern elephants, and, although *Mærittherium* was no bigger than a large pig, the limbs already showed signs of increased size, and some of their bones (the femur, for example) were of distinctly elephantine type.

In the Eocene epoch, when *Mærittherium* lived, the landscape of the Fayûm was not at all as it is today. Much of North Africa was covered by an ancient sea called Tethys, and instead of the barren Sahara a vast region of swamps and fertile plains extended from half-way across the present Atlantic ocean to the

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easternmost bounds of Arabia. This was the environment in which scientists believe that *Maritherium* made its home, and several points of its anatomy suggest that it was a swamp-loving animal, partly aquatic in its habits. For example, the eyes and ears were raised to a high position on the skull as in the modern hippopotamus, and it seems likely that its short, stout limbs were amply encased in fat. Another resemblance to the hippopotamus lay in the lips, which were probably heavy, square-cut structures well suited for grubbing in the mud and cropping the leaves of plants. *Maritherium's* greatest happiness probably lay



Maritherium (left) and *Phiomia* in an Eocene swamp.
Reconstruction by Maurice Wilson

in wallowing along the fringes of the primeval rivers and estuaries, contentedly munching the swamp vegetation growing along the banks. And in the intervals of feeding one can imagine it disporting itself in small herds and family groups with the same cheerful splashings and snortings that characterize the hippopotamuses of today.

The other two primitive proboscideans found in the Fayûm formations have been called by scientists *Phiomia*, or "the lake province one" and *Palæomastodon*, or "ancient mastodon". Although first discovered in fossil form by Beadnell and Andrews, a certain amount of additional material was collected by Professor Osborn himself. His expedition was carried out with that streamlined efficiency and complete disregard of

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financial obstacles that we have come to regard as characteristically American. He waited courteously till the earlier British discoveries had been published in 1906, and then, on January 23rd 1907, arrived at Shepheard's Hotel, Cairo, with a party of fossil hunters, a personal letter from President Theodore Roosevelt to Lord Cromer (then Viceroy of Egypt), and a large bank balance placed at his disposal by the American Museum of Natural History.

Sixty camels strong [he writes], we wound our way past the pyramids of the western side of the Nile, skirted the fertile basin of the Fayûm, and struck southwards into the waterless desert until we reached the region that represented the ancient cradle of the elephant family. We at once set to work with a very superior force of Egyptian excavators from Kuft, under the direction of Mr. Walter Granger and Mr. George Olsen, two of the best fossil hunters of America, who stuck to their arduous post for nearly two months, until driven out by sandstorms and excessive heat. With their skilled aid, we soon discovered the burial sites of three of the early elephant dynasties. . . .[34]

Both *Phiomia* and *Palæomastodon* came from Lower Oligocene strata, and thus appeared at a later period than *Mærittherium*. Yet they are not descended from *Mærittherium*, which continued to exist alongside them, and they probably represent separate evolutionary lines which had gradually become adapted to life away from the water. Both animals showed a considerable increase in size, and some specimens may have attained the height of a modern African forest elephant. They had four tusks, two above and two below, but these were still very rudimentary and projected only a short distance beyond the jaws. The lower tusks were probably used as an aid to feeding, but the upper ones show the first stage in the development of offensive or defensive weapons—an evolutionary trend that reached its height in the Pliocene and Pleistocene epochs and can still be observed in the magnificently tusked African elephants of today. An interesting feature of both animals was a considerable elongation of the lower jaw, of which the tusks formed a spoon-shaped extension. This was particularly marked in *Phiomia*, and led eventually to the evolution of the extraordinary shovel-tusked to be described in the next chapter. Whether either of

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the Oligocene proboscideans had a trunk is still not known. Osborn was strongly of the opinion that *Phiomia* lacked this structure, and grasped its food by pressing down on the lower tusks with an exceptionally strong upper lip. On the other hand, in his reconstructions of *Palæomastodon*, he shows it with a short trunk, like the "blackish, bulgy nose" possessed by Kipling's Elephant Child before it was seized by the crocodile. Whether or not this interpretation is correct we can at least be certain that no proboscidean at that time had anything as fascinating or as splendid as the trunks possessed by elephants today.

The presence or absence of a trunk is a good indication of feeding methods and therefore of the kind of habitat in which *Phiomia* and *Palæomastodon* lived. If Osborn is correct in believing that *Phiomia* had no trunk, then it was probably an animal of the lowland plains where its particular feeding mechanism would have helped it to browse off the leaves and shoots of scrub vegetation. On the other hand, the short trunk of *Palæomastodon*, if it possessed one, would probably have been more suited to a forest environment, where it would have been useful in pulling down the lower branches of trees. It is interesting to speculate along these lines, but we should remember that in the absence of certain knowledge dogmatic assertions would be out of place. A great deal of learned hot air has already been expended on the subject, and this is certainly a case where the layman can take the pronouncements of even the most eminent specialists with rather more than a grain of salt.

The remains of these early proboscideans of the Eocene and Oligocene have so far been found only in Africa, a fact which suggests that the order as a whole originated in that continent. But from this evolutionary centre a great fanning out of proboscidean types occurred. This process, which is known to scientists as "adaptive radiation", is a common phenomenon in the history of life. The growth of competition within a single stock leads some of its members to seek an alternative livelihood in new environments. Each new environment produces the need for different adaptations and, by the now familiar process known as natural selection, these are gradually acquired. Eventually the adaptive variations occurring in different regions lead to such wide divergences in the various branches of the

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original stock that new species are created. Thus we have already seen how *Maritherium*, *Phiomia*, and *Palæomastodon*, although sharing a common ancestor, had each taken to a different habitat quite early in the story of elephant evolution. The various adaptations they made to these were the cause of their acquiring very different physical characteristics, and of their eventual specific separation. As the millennia passed this process continued, until by Miocene times a bewildering number of proboscidean types were scattered over the greater part of the Earth's surface.

It seems that the primary migration was to Asia, which itself became a great centre of radiation for many different lines of descent. It was from this second homeland, as well as from Africa itself, that the proboscideans began their widespread global wanderings. The pressure of competition within a limited environment was doubtless one of the main driving forces behind such migrations, but in addition the souls of these animals seem to have been possessed, like those of men, by an insatiable wanderlust, which carried them into the furthestmost places of the Earth. The process was made easier by the fact that in these distant times there were land links between all the continents except Australia and Antarctica. It is probable that Europe was joined to Africa at the Straits of Gibraltar, and between the toe of Italy and Tunis, as well as in the east; the East Indies were not then scattered islands, but were joined to the Asiatic continent in a single peninsula; and eastern Siberia and Alaska were connected at the present Bering Strait. Thus few regions were inaccessible to these daring animal explorers, and they turned up in different evolutionary disguises in every imaginable habitat from the wastes of the northern tundra to the rain forests of the tropics and the grass-covered plains of North and South America. In each of these varied environments, and in the many others to which they penetrated, new adaptations were called for, and many new genera and species branched away from the original stem. Some of the specializations that resulted from this process were bizarre in the extreme. In the following pages I shall pass some of these strange creatures in review and try to show what role they played in the long and dramatic story of proboscidean evolution.

CHAPTER EIGHT

The Dinotheres and Mastodons

BY THE DAWN of the Miocene some 35 million years ago the tremendous radiation of proboscidean types described at the end of the previous chapter was well under way. Europe, Asia, and North America had already submitted to their invasion, and the whole of this area was the home of a multitude of different genera and species, each following its own evolutionary path and adapted to a greater or lesser extent to new environments and ways of life. The keenest student could well be daunted by this great array of elephantine types, and to describe them all would be to turn this part of our story into a dreary catalogue of the tooth and jaw measurements of animals with progressively more unpronounceable names. To reduce such a vast accumulation of fact to readily comprehensible form it will thus be necessary to make some drastic simplifications. These, I hope, will assist the layman to understand something of the romance and excitement of the story without causing the specialist to shudder to any appreciable extent.

The Miocene proboscideans and their descendants can be conveniently grouped into four main categories. These are (1) the dinotheres, or "terrible beasts", (2) the long-jawed mastodons, commonly known as gomphotheres or trilophodonts, (3) the short-jawed, or "true", mastodons, and (4) the modern elephants and their immediate ancestors and relations. The way these four main groups are connected with one another will be made clear from the Elephant's Family Tree on page 105. Here I shall deal only with the dinotheres (suborder Dinotherioidea) and mastodons (families Gomphotheriidae and Mastodontidae), leaving the origin of the modern elephants (family Elephantidae) for consideration in the next chapter.

It has taken over two and a half centuries for scientists to build

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up a full picture of what the dinotheres were like. The story begins in 1715, when the French scientist René Antoine Ferchault de Réamur published an illustration of a tooth found near Lyons at the beginning of the previous century. He did not assign it to any particular animal, but it was later recognized as the first recorded evidence of a new kind of fossil mammal of exceptionally large size, which the German naturalist Johann Jakob Kaup later named *Dinotherium*. Another tooth was described in 1773, then some fragments of a jawbone, and at length a complete skull, found at Eppelsheim in Germany in 1836. The rest of the skeleton was still not known, but later finds allowed the authorities at the Vienna Museum to make a complete reconstruction of the animal, which was placed on show there in 1908.

By this time it was realized that there were several different species of *Dinotherium*, distinguished mainly by their size. The Vienna specimen was regarded as belonging to the smallest species, with the name of *Dinotherium bavaricum*, but even so it measured over 8 feet high at the shoulder. It was estimated that the largest species, aptly known as *Dinotherium gigantissimum*, or "hugest terrible beast", must have been at least the size of a large African elephant of today.

The reconstruction on Plate 9a shows how *Dinotherium* probably looked in life. The head was much more flattened than that of the modern elephant, but there was a well-developed trunk. The animal's most distinctive feature was the two great hooked tusks in the lower jaw, which, instead of projecting generally forward as in most other proboscideans, curved back towards the animal's chest. The use of these extraordinary structures has caused a great deal of controversy, and several entertaining theories have been proposed. For example, the nineteenth-century English geologist William Buckland, writing before the full skeletal material was available, believed that *Dinotherium* was an aquatic mammal and that the tusks were probably used for anchoring their owner to the bank when it wanted a quiet snooze. Several other writers regarded it as an herbivorous sea monster, with flippers instead of the usual legs and feet, which nevertheless occasionally ventured onto dry land and used its tusks for pulling itself along the ground. During the last

half-century the idea that *Dinotherium* was aquatic in habits has had to be abandoned, for there is little in the limbs, feet, trunk, or general skeletal structure that would support such a view. It has thus been necessary to find a new explanation of the use of the tusks, and some of the modern theories have been almost as unlikely as those already quoted. For example, it has been said that the tusks were used for grubbing in the ground for roots or hooking down branches from trees. But a glance at the skeleton will show that to reach the ground with its tusks the animal would have had to sink onto its knees—an inconvenient and dangerous feeding position that would hardly have made for survival. The pulling down of boughs could have been achieved quite satisfactorily by the use of the powerful trunk alone. The only other explanation would seem to be that the tusks were used quite simply as weapons in battle (although admittedly they were rather ill-adapted for this purpose), or for tearing the bark away from trees for food by a vertical scraping motion. To most people, however, such theories will seem as unconvincing as the rest, and for the present it seems we must be content to regard the use of the tusks as an unexplained mystery.

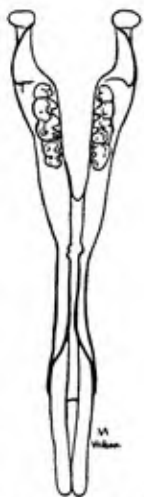
The dinotheres were widespread in Europe, Asia, and Africa for well over 30 million years. They represented a somewhat isolated line of evolution which probably originated at a stage even earlier than the first appearance of *Phiomia*. They died out in Europe and Asia before the end of the Pliocene, but persisted in Africa until the Pleistocene was well advanced. The smallest species appeared first, and during the life-span of the suborder there was a progressive increase in size. But in other ways the dinotheres remained exceptionally stable. The later specimens, although of greater bulk than their ancestors of 30 million years before, were anatomically almost identical with them. This is a remarkable example of the persistence of a highly specialized type of animal over a very long period of time, and shows that for much of the Cenozoic era the conditions prevailing in the dinotheres' main habitats could not have provided them with any serious challenge. Why they eventually died out is not certainly known, but the problem will be considered in a more general context in Chapter Ten.

THE DINOTHERES AND MASTODONS

Turning from the dinotheres to the mastodons, we are back in the full hurly-burly of proboscidean evolution. The term mastodon means "breast tooth" and was coined by Baron Cuvier, who (being nothing if not a Frenchman) fancied he saw a likeness between the paired tubercles on the mastodon's molar teeth and the breasts of a human female. The long-jawed mastodons, with which I shall begin, are descended either from *Phiomia* or a creature very like it; they were widespread over Africa, Eurasia, and America throughout the Miocene and Pliocene and in some areas persisted until well into the Pleistocene. One species, known as *Cuvieronius postremus*, even lived into historic times, having been killed, cooked and eaten by men who left with its remains obsidian implements and decorated pottery dating from 200 to 400 A.D.

The typical early genus of the Miocene has been variously called *Trilophodon*, *Gomphotherium*, and *Tetrabelodon*, but as one tongue-twister per animal will doubtless be sufficient even for the most devout seeker after truth I shall here restrict myself to the first of these names. *Trilophodon* means "three-crested tooth", the name being derived from the peculiar configuration of the first two molars; but to the lay eye the most remarkable feature of the animal will probably be the enormously extended lower jaw, with its two flattened tusks. The upper jaw was likewise elongated, but not to the same extent, and was equipped with two somewhat longer tusks. An elongation of the upper lip in the form of a short trunk probably projected some distance beyond the end of the tusks, and was used for tearing vegetation from bushes and low trees. The animal was about twice the size of *Phiomia*, to which it otherwise had a strong family resemblance.

The remains of *Trilophodon* were first discovered in western Europe in the early nineteenth century and described by Cuvier in 1817.[35] Later fossils were found in Africa, Asia, and North America, so *Trilophodon* had an exceptionally wide range. It



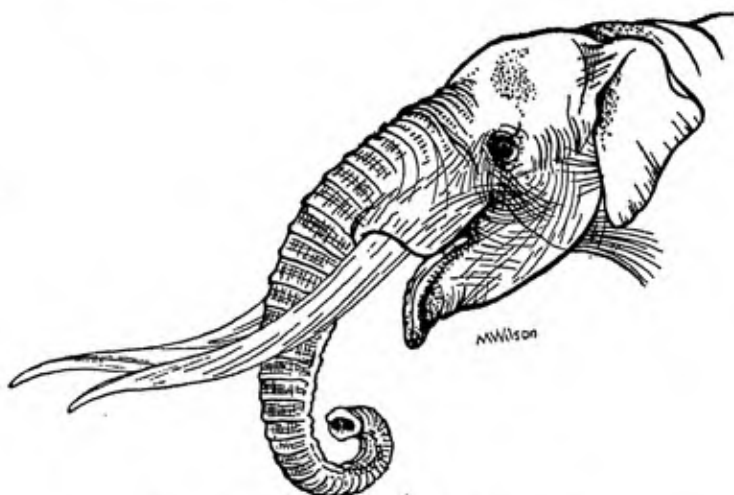
Lower jaw of
Trilophodon

was eventually replaced in the Old World by a related creature known as *Tetralophodon*, with a much-reduced lower jaw. It is interesting to note, incidentally, that this shortening of the jaw was not accompanied by a similar reduction in the trunk, which was left for part of its length as a free-hanging organ. In the Pleistocene proboscidean known as *Stegomastodon* this process was carried still further, the lower jaw being so reduced that the trunk hung freely down like that of a modern elephant.

The three main genera just described represent one of the main lines of mastodon evolution, but there were several bizarre side branches. For instance, it would be difficult to imagine stranger creatures than the "shovel-tuskers" which lived during the Miocene and Pliocene epochs in Asia and North America. These were simply long-jawed mastodons which had become highly specialized for life in one particular environment. A typical example was *Amebelodon* from the Pliocene of Colorado and Nebraska, which had a long trough-shaped lower jaw, ending in two tusks measuring nearly 4 feet in length. The tusks were much flattened, and lay close beside one another to form a broad spade-like structure for which at first it is difficult to see the use. The most likely explanation is that *Amebelodon* was a semi-aquatic creature and used its lower jaw for shovelling up water plants from beneath the surface. The jaw was probably opposed by a strong trunk reaching to the tip of the tusks or slightly beyond them. The plants could thus be gripped between the tusks and the trunk, torn from the bottom, and pushed back by the trunk along the trenched mandible into the mouth. This strikes us as being a rather laborious method of eating, but it must have been a successful one, for other long-jawed mastodons made similar adaptations. Examples of these are *Platybelodon*, from the Upper Miocene of the Caucasus and Mongolia, which had short, very broad tusks, and a related form, whose remains were found in Pliocene beds on Snake River, Nebraska. Incidentally, the name of this last animal is a particularly charming example of zoological nomenclature. With the intention of immortalizing the American palæontologist Barnum Brown, it was called *Torynobelodon barnumbrowni*, which despite its somewhat formidable sound, simply means "Barnum Brown's spoon-tusked one".

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The shovel-tuskers were not the only strange-looking animals closely related to the trilophodont mastodons. In North and Central America in Miocene and Pliocene times there lived the extraordinary Rhynchorostrines, or beak-snouted mastodons. As their name implies, these were distinguished by a strong down-curving of the lower jaw suggestive of a beak. Another odd genus was *Cordillerion* (identified by some authorities with



Cordillerion, showing spirally twisted tusks.
Reconstruction by Maurice Wilson

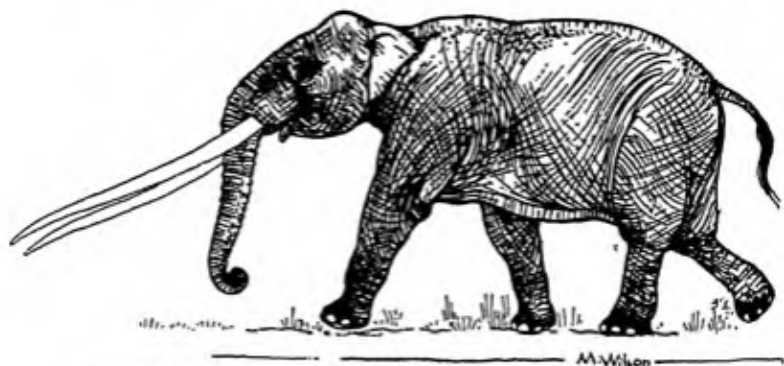
Cuvieronius, mentioned above), which lived in Arizona and California at the end of the Pliocene epoch, and later succeeded in crossing the equatorial forest belt north and south of the isthmus of Panama and invading South America. In that continent the members of the genus spread into many different environments, from the grassy plains of the east to high up on the great Andes range of the Pacific seaboard. They were distinguished by their comparatively small size and the strange configuration of the upper tusks, which were spirally twisted like a narwhal's horn.

Cordillerion showed the same tendency towards a shortening of the lower jaw that I have already mentioned in connection

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with *Stegomastodon*. Another trilophodont showing this characteristic was *Anancus* from the Upper Pliocene and Pleistocene of Eurasia, which had a lower jaw that had receded until its point was well beneath the main body of the skull. It stood just over 8 feet high at the shoulder, and was distinguished by its extraordinarily long and straight tusks. As can be seen from the reconstruction below, these were over two-thirds the length of the animal's body.

Contemporary with the long-jawed mastodons were the so-called "true" mastodons of the family Mastodontidæ, and we



Anancus, a trilophodont with exceptionally long, straight tusks.
Reconstruction by Maurice Wilson

must now briefly set out the main distinctions between the two groups. All the mastodons so far described have either had the typical long lower jaw of the trilophodonts, or represent evolutionary offshoots from this stock in which this exaggerated development has been gradually lost. With the true mastodons, on the other hand, while the lower jaw showed a certain elongation in its early evolutionary stages, it never developed to the exaggerated extent found in the trilophodonts. In fact, it now seems possible that the two groups of mastodons followed entirely distinct lines of evolution from a very early stage, perhaps with *Phiomia* and *Paleomastodon* as their respective ancestors. I do not wish to labour these technical points, which are anyway still controversial, but the reader should remember that in spite of an undeniable parallelism in their

evolutionary development, the true mastodons may not be as closely related to the trilophodonts as superficial appearances sometimes suggest.

The true mastodont line seems to be a remarkably simple one. It can be said to begin about 40 million years ago, either with *Paleomastodon*, or a creature very much resembling it, and to end with the famous American mastodon, *Mastodon americanus*, which survived well into historic times. Between these points only two intermediate stages are tentatively recognized. These are *Miomastodon* of the Miocene and *Pliomastodon* of the Pliocene, but unfortunately so few fossilized remains of these animals have been found that they are of little value in clarifying the early stages of mastodon evolution. Moreover, both genera may represent parallel stages of evolution to *Mastodon americanus* rather than a true ancestral line, and to introduce them in the present context would only cause confusion. I therefore propose to conclude this chapter with a brief account of the American mastodon itself.

The first remains of *Mastodon americanus* were discovered on the Hudson River in 1705 and 1714, and near the Ohio River in Kentucky in 1739. They consisted of a thigh-bone and a few teeth and, although described in a number of learned periodicals, aroused little interest even among specialists. It was not until the end of the eighteenth century that the work of the French naturalists Buffon and Cuvier, and the German physiologist Blumenbach began to throw more light on the significance of the finds. Even then the fossils were not given proper scientific names. Blumenbach referred, somewhat unsatisfactorily, to the owner of one of the Ohio River teeth as the *Ohio-Incognitum*, while as late as 1806 the usually meticulous Cuvier was still vaguely writing of "the Great Mastodon" of Ohio.

The Kentucky discoveries of 1739 came from a locality known as Big Bone Lick, which was formerly an open lake but was gradually choked with swamp vegetation until it became a treacherous bog. Towards the close of the Great Ice Age some 20,000 years ago this bog was a death-trap for any large animal that incautiously ventured onto its surface. Vast numbers of fossils have been recovered from the area, including remains

of bison, reindeer, moose, wild horse, and over a hundred mastodons. In the early years of these discoveries they caused such a sensation that they aroused the interest of President Jefferson of the United States, who set aside a room in the White House for the display of fossils he had acquired from Big Bone Lick.

Of the many mastodon finds made here and elsewhere in North America during the nineteenth century several were of complete skeletons in a magnificent state of preservation. One of the best known was the famous "Warren" mastodon, discovered in Pleistocene formations on the Hudson River, near Newburgh, New York, in the summer of 1845. It received its popular name of "Warren" after Dr. John C. Warren, who described it exhaustively in a famous memoir in 1852, but the species to which it belonged was at this time officially known to scientists as *Mastodon giganteus*. This was generally accepted as the specific name until 1868, when the new name of *Mastodon americanus*, by which it is still known today, was generally adopted.

The Warren mastodon was at first incorrectly mounted with the head set far too high on the body and the tusks pointing downwards in a most unconvincing way. Shortly afterwards it was remounted at the Warren Museum in Boston in more acceptable anatomical shape, but with exaggerated papier-mâché tusks and a lavish coating of heavy black varnish which effectively obscured the colour and texture of the bones. It was not until 1907 that Osborn was able to have the specimen mounted yet again under his own supervision in a form that is now regarded as generally correct.

Dr. Warren was lyrical in his enthusiasm for the specimen, even in its early, somewhat unsatisfactory arrangement. He wrote:

Language is insufficient to give an idea of the grandeur of this skeleton as a whole. Standing as it does in the midst of those of various large animals—the horse, the cow, &c., and towering above them, its massive limbs make them sink into insignificance. Even the elephant, although nearly as tall, has a frame which might be called delicate when compared with that of the Mastodon.[36]

THE DINOTHERES AND MASTODONS

From this specimen, and from many others, we can now gain a very full impression of what these American mastodons were like. They were massive animals, and exceptionally heavily built, although not taller than a modern elephant as Warren suggests. The Warren mastodon, which was of average size, measured some 15 feet in length from the base of the tusks to the drop of the tail and stood over 9 feet high at the shoulder. The largest known mastodon, whose skeleton is now in the Geological Museum of Ohio State University, had an estimated shoulder height in the flesh of 10 feet 2 inches. The mastodon head was more pointed than an elephant's, with a flattened brow, and was carried horizontally instead of being inclined towards the ground. There was a well-developed trunk, and the great curving tusks projected some 6 to 9 feet from the upper jaws. Vestiges of skin preserved with the bony parts of some of the specimens show that the mastodons were originally covered with a coat of long reddish-brown hair. The teeth were much more primitive than those of the modern elephant, and, instead of ridges, carried the breast-shaped prominences that gave the animal its name.

Although the true mastodons are now primarily associated with North America because of the great numbers of their remains that have been found in that continent, it should not be inferred that they were unknown elsewhere. The fact that they reached America from their ancestral home in north-east Africa by way of the now vanished land bridge across the Bering Strait shows that they must have been involved at some time in their history in a long migration across the whole width of Asia. Their fossil remains have also been recovered from geological formations in Europe, and although no bones exactly corresponding with *Mastodon americanus* have yet been found in South America, it seems most likely that in



Two views of a mastodon molar, showing breast-like prominences

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Pliocene and Pleistocene times they must have penetrated to that continent as well.

Recent methods of dating fossil bones show that the true mastodons survived in North America until less than eight thousand years ago. It is thus almost certain that they came into contact with the early men of that continent, who must have followed in the path of their migrations from eastern Siberia. This is continued by traditions concerning gigantic animals "with long noses" which are quite common in the mythology of the American Indians. Also elephant-like creatures are depicted in Mexican pictures of a period well before the arrival of the first Europeans on America's Atlantic seaboard.

With this interesting possibility we must leave the ancient mastodons and inquire how the true elephants arose from the ranks of the proboscidean order.

CHAPTER NINE

The Origin of the True Elephants

TO THE LAYMAN the natural scientist's preoccupation with the teeth of the animals he studies often seems to be evidence of a dreary, if not actually warped, mentality. Are there not enough beautiful and interesting things about animals, he asks, that one must be for ever looking into their mouths? Unfortunately, for those interested in evolution, there is no alternative to this apparently somewhat uninspiring procedure, for the teeth of living things are the surest guide to their relationships, and the way they have developed. And if the student perseveres, he may find himself filled with a growing wonder and enthusiasm for the object of his researches which even a Wimpole Street dentist would find it difficult to understand, however absorbing or lucrative his practice.

It is mainly on the basis of their teeth characters that the true elephants have been separated from the more primitive mastodon types described in the previous chapter. There are other distinguishing features of course, such as their rounded heads, their curving tusks, and their exceptionally short lower jaws, but such criteria can never be as conclusive as a comparison of two really good molars. As already stated, the typical mastodon has simple molars with a number of breast-shaped prominences on their upper surface, whereas the elephant molar is a much more complicated structure, consisting of varying numbers of flattened transverse plates of enamelled dentine. The mastodon also lacks the highly specialized system of molar succession of the true elephants which was described in Chapter Two. A comparison between the figures on pages 38 and 121 will show how very easy it is to distinguish the two types of teeth.

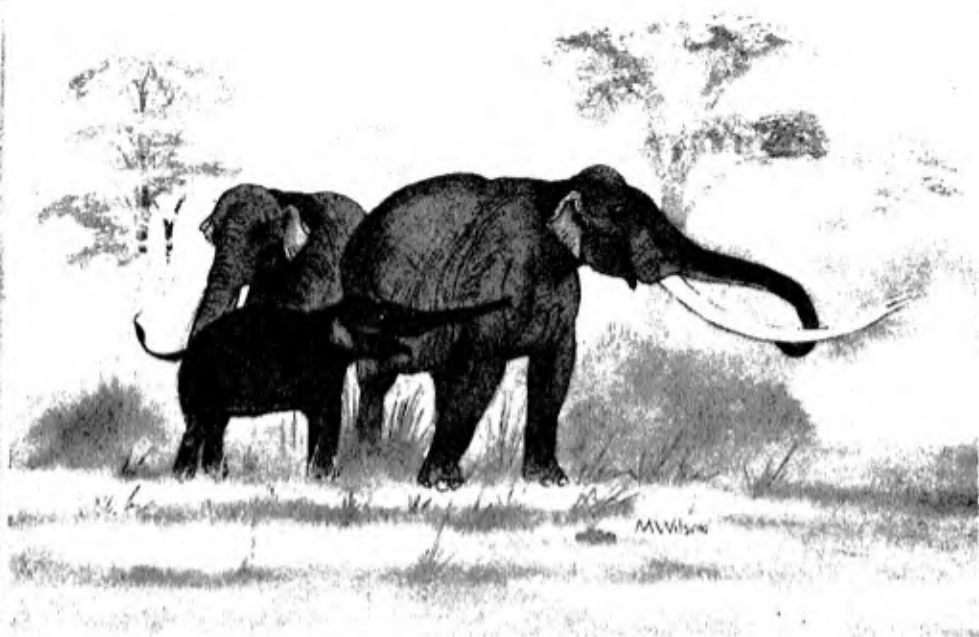
The earliest proboscidean to show the beginnings of the characteristic tooth structure of the true elephants was known

as *Stegodon*, or "roof-toothed one". This animal had up to fourteen simple ridges on the molars, and it was their somewhat roof-like shape that gave it its name. It was a bulky, long-limbed creature and, apart from its teeth, showed other typical elephantine features. It lived during the Pliocene epoch in Asia, where its remains have been found in some famous geological formations in the Siwalik Hills; later representatives of the genus wandered back to the ancestral home of the proboscideans in Africa. The ancestry of *Stegodon* is not certainly known, but it obviously represents an early stage in a distinct line of proboscidean evolution. This line must have diverged from the trilophodont and mastodon stems sometime during the Miocene some 30 million years ago, and it led, as we now know, to the true elephants of today.

The evolutionary progeny of *Stegodon* can themselves be assigned to two different lines of descent. The first was comparatively simple and primitive, and culminated in *Loxodonta africana*, the great African elephant of today; the second was more intricate, with many subsidiary branches, one of which led to the present Asiatic elephants (*Elephas maximus*) and another to the famous extinct elephants known as mammoths. These last, of which there are several different species, are sometimes regarded as being true members of the genus *Elephas*, but I shall here follow the alternative practice of grouping them together in a separate genus with the name *Mammuthus*. Although the mammoths were closely related to the living Asiatic elephants, they certainly had sufficient points of difference to warrant the use of a separate label.

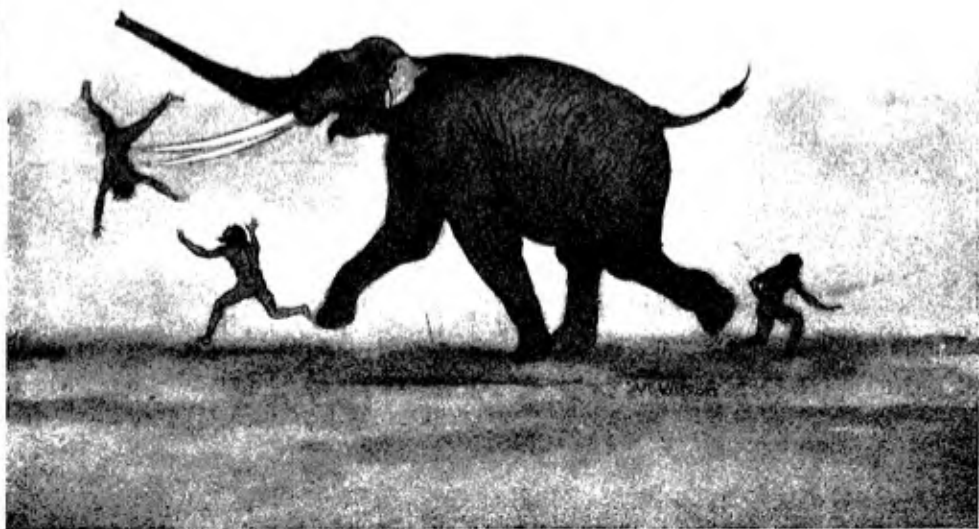
Of the primitive line leading to the African elephants the most important representative was *Palæoloxodon antiquus*, a straight-tusked elephant which lived in southern Europe and northern Africa during the Pleistocene period, and then became extinct. Some representatives of this species reached a height of 14 feet at the shoulder, and were thus among the giants of the proboscidean order.

Oddly enough, the nearest relations of these huge "ancient loxodonts" were exceptionally small. Their remains were found in rocks of Pleistocene age on Malta and other Mediterranean islands by a succession of nineteenth-century investigators,



11 a) The ancestral elephant *Stegodon ganesa*. Reconstruction by Maurice Wilson

b) The straight-tusked elephant, *Palæoloxodon antiquus*. Reconstruction by Maurice Wilson





12 a) The 'imperial' mammoth *Mammuthus imperator*. Reconstruction by Charles R. Knight

b) The woolly mammoth *Mammuthus primigenius*. Reconstruction by Charles R. Knight



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including an enterprising British surgeon named Andrew Leith Adams. Adams described his discoveries in a book entitled *Notes of a Naturalist in the Nile Valley and Malta* (1870) which included a plate showing reconstructions of the elephants in their natural surroundings. The plate also depicted a number of other creatures whose bones were found at the same time, including an extinct species of hippopotamus, a large extinct fresh-water turtle, a giant dormouse, and a giant swan. The pictures were by no means accurate, but as they represent one of the earliest, and most charming, essays in fossil reconstruction, the plate is reproduced here in its original form (p. 126).

The three elephants in Adams' plate are ascribed to the genus *Elephas*, but later researches have shown that they are in reality more closely related to the loxodonts. For this reason they have now been placed in the genus *Palaeoloxodon* with their gigantic relation. The largest of the three animals (*Palaeoloxodon mnaidrensis*) stood only about 6 feet 3 inches at the shoulder and was thus roughly comparable in size to a small modern African forest elephant. The others (*Palaeoloxodon melitensis* and *palaeoloxodon falconeri*) had a shoulder height of 4 feet 7 inches and 2 feet 11 inches respectively, which entitles them to rank as genuinely dwarfed forms. One of the distinguishing features of these animals, as of a related species found in India (*Palaeoloxodon namadicus*), was the enlargement of the bones of the skull into an extraordinary crest-like structure encircling the front of the head. A tendency towards this development was already foreshadowed in the ancestral *Stegodon*, but it had not yet reached such pronounced form. The crest was not shown at all on Adams' plate but can be well seen in Maurice Wilson's reconstruction of *Palaeoloxodon mnaidrensis* on page 127.

None of the various species of *Palaeoloxodon* represent the direct ancestors of the African elephant of today, but we can at least be sure that they were fairly near the main stem. When we come to the ancestry of the Asiatic elephant, however, the position is more obscure. Osborn does not place any fossil forms in the genus *Elephas*. His two most nearly related genera, which he calls *Hypselephas* and *Platelephas*, date from the Lower Pleistocene of a million years ago and differ widely from the existing Asiatic elephants in many important respects. In the

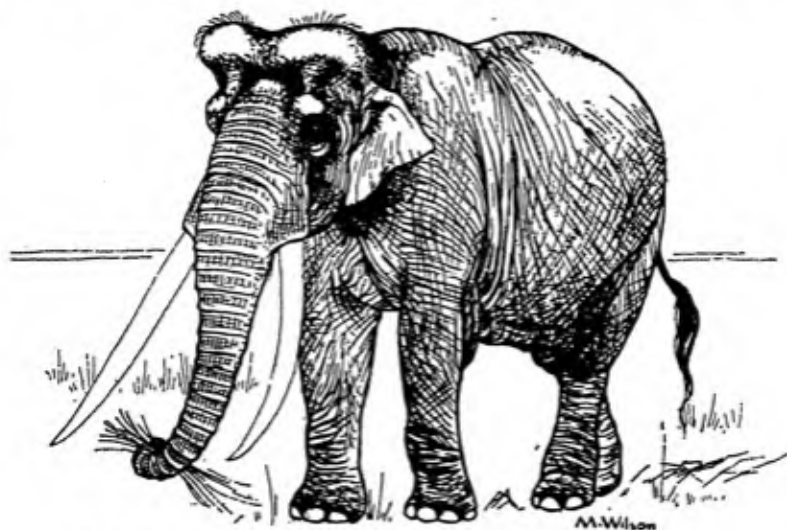


Denizens of Ancient Malta: 1. Large extinct elephant, *Palaeoloxodon mnai-densis*. 2. Extinct dwarf elephant, *Palaeoloxodon melitensis*. 3. Smallest dwarf elephant, *Palaeoloxodon falconeri*. 4. Extinct hippopotamus. 5. Giant dormouse. 6. Extinct swan. 7. Large extinct fresh-water turtle. From Adams (1870)

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absence of more certain evidence it would be futile to speculate on the exact lineage of the Asiatic elephant at the present time. I shall therefore conclude this chapter with an account of that much-publicized group, the mammoths.

The word "mammoth" appears to be a corruption of the earlier form "mammout", which, as far as I can discover, was first used in western European literature in the year 1694 in a book entitled *Noord en Oost Tartarye* by a learned Dutchman,



Palæoloxodon mnaidrensis. Reconstruction by Maurice Wilson

the burgomaster of Amsterdam, named Cornelius Witzen. In 1666 Witzen visited Moscow, and his book was the result of researches there and elsewhere in the region. After describing how numbers of elephants' teeth are found on the banks of Siberian rivers, he adds: "By the Inlanders" (that is, the Russian settlers in Siberia) "these teeth are called Mammouttekoos, while the animal itself is called Mammout." [37] The derivation of this form of the word is itself obscure. It has variously been regarded as a corruption of the name of the Russian Saint Mamant; of a Tartar word *mama*, meaning earth (which cannot, however, be traced in the Tartar tongue); of *mut* or *muut*, which is said to be the Estonian for "mole"; and of

the biblical name "behemoth", which, it is alleged, was imported into Greater Tartary by Arab travellers. Etymologists are never happier than when indulging in these attractive, if somewhat futile, speculations, and amateurs at the game will be able to divert themselves for days concocting alternative theories. But as the true origin of the name is an unsolved mystery, and likely for ever to remain one, I shall not delve further into the matter here.

Four main types of mammoth are known from the fossil record. These are: the flat-browed mammoth (*Mammuthus planifrons*) from the Upper Pliocene and Lower Pleistocene of India; the southern mammoth (*Mammuthus meridionalis*) from the Upper Pliocene and Lower Pleistocene of Europe; the "imperial" mammoth (*Mammuthus imperator*) from the Lower Pleistocene of the United States and Mexico; and the woolly mammoth (*Mammuthus primigenius*) from the Upper Pleistocene of Eurasia and North America. The true relationships between these animals, and even their names, are still controversial, and they are sometimes referred to different genera as a result of the divergent views and even sometimes (I regret to say) the prejudices of different authorities. The scientific names given here, which are based on the work of Professor A. S. Romer, [38] therefore represent a compromise between a wide variety of opinions. Purists will probably regard the adoption of the single generic name *Mammuthus* for all four species as an unpardonable simplification, and will be horrified that no reference is made to several other important mammoths, such as *Mammuthus jeffersoni* and *Mammuthus trogontherii*; but the line had to be drawn somewhere, and a writer on elephants must be prepared to have his head belaboured by at least some of his readers or he would never put pen to paper at all.

Mammuthus planifrons and *Mammuthus meridionalis* were the first mammoths to evolve from the original stegodont stock, and were well known in Asia and Europe respectively nearly a million years ago. They were readily distinguishable both by their size and the character of their skulls, the former species having a flat forehead and being comparatively small, the latter having a domed forehead and greatly exceeding the largest living African elephant in bulk. *Mammuthus imperator*,

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which evolved somewhat later, may have been descended from one of these two earlier forms. It had migrated to North America, where it roamed in vast numbers across the southern Great Plains of what is now the United States. Like *Mammuthus meridionalis* it was a gigantic creature, some specimens standing between 14 and 15 feet high at the shoulder.

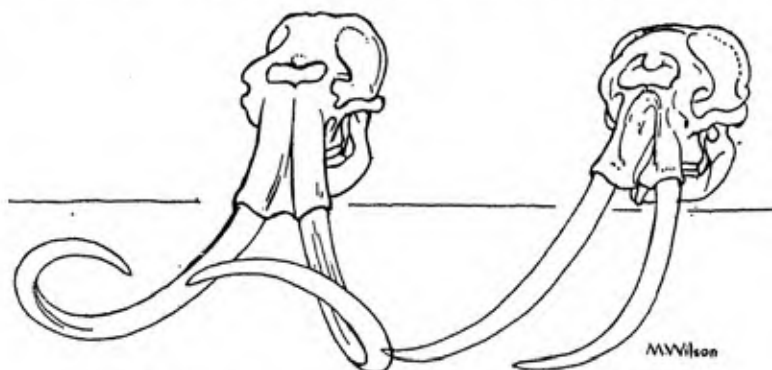
The woolly mammoth (*Mammuthus primigenius*), although its scientific name means "first-born mammoth", was the last of the four species to appear. Unlike the other mammoths, which lived in warm and temperate climates, it was a creature of the snows, and made its home along the fringes of the ice sheets that covered the northern continents during the latter part of the Great Ice Age. To protect itself from these hard conditions it grew a coat of dark reddish-brown hair, as we know from portions of its flesh and skin which have been preserved in the permafrost, or permanently frozen ground, of Siberia.* Contrary to popular belief it was not a particularly large animal, its dimensions being about the same as those of an Indian elephant of today. Its teeth were very different from those of its predecessors, and showed an extreme degree of specialization. Whereas *Mammuthus planifrons* and *Mammuthus meridionalis* had respectively twelve and fourteen ridges on the hindmost molars, *Mammuthus primigenius* had twenty-seven. This specialized tooth structure reflects the animal's environment, for the additional hardness and strength imparted by multiple ridges would have enabled it to deal with the coarse tundra vegetation that formed its main diet.

The tusks of the woolly mammoth were considerably larger than those of existing elephants. As previously stated, the largest known elephant tusk measures 11 feet 5½ inches along the outside curve; the largest woolly mammoth tusk of which I can find a record,[39] measures 16 feet 5 inches in length, or nearly half as long again as that of the elephant. Apart from their greater size the mammoth tusks were very different in shape. They emerged from the jaw closely side by side, but then began to spread apart; next, gradually spiralling on their axes,

* Professor F. E. Zeuner has pointed out to me that the reddish-brown colour may not have been the original colour of the coat, but has possibly been produced by the passage of time.

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they turned inward to form a huge circle, sometimes with their tips actually crossing. When this stage was reached they must have been singularly ineffective as weapons, and their only apparent use was to protect the trunk with an ivory girdle, rather as a hard steel bumper protects the softer metal of a motor car. This matter will be considered further in the next chapter, but meanwhile the remarkable differences in shape between the tusks of the mammoth and the living African elephant can be clearly seen in the illustration below.



Tusks of the woolly mammoth (left) and the living African bush elephant compared

Apart from its tusks the woolly mammoth had several other distinguishing features. Its back fell away sharply at the hind-quarters in a manner not paralleled in living elephants, nor even in other species of mammoth, and it had a particularly well-developed trunk. Its ears were small, averaging some 15 inches in length and 6·7 inches in breadth; like the rest of its body they were covered with hair. The tail was some 14 inches broad at the root, and tapered to a sharp point embellished with a bunch of bristles. The skin was much thicker than that of living elephants, and beneath it was a layer of fat up to 3½ inches deep; this, like the coat, was an obvious adaptation to the climate in which the animal lived. The coat itself has been well described by Osborn. He writes:

The whole body was thickly covered with fine soft hair about an inch long, varying in color from faded blond to yellow brown;

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coarser and longer hair, sometimes 20 in. in length, of a dark, rust-coloured brown, covered the entire neck and trunk, perhaps forming a fringe of hair still heavier and thicker from the cheeks along the shoulders and sides to the rump.[40]

Another distinctive feature was the exceptionally bulbous forehead, with its thick coating of hair. Osborn writes:

This swollen forehead, we are sure, was a food reservoir for the winter season which disappeared as winter advanced into spring, when the deep fatty covering all over the body was exhausted and the animal began to assume the normal outlines and proportions of other elephants.[41]

There is unfortunately no justification for this belief. The domed forehead is accounted for by the exceptionally well-developed air sinuses, surmounted by a thick crop of hair, and the food reservoir consisted of a fatty hump on the shoulders.

I have described elsewhere [42] how the frozen bodies of mammoths some 20,000 years old were found by Russian travellers in the permafrost of Siberia. Here it will only be necessary to underline how important such discoveries were in adding to our knowledge of this astonishing creature. Several of the Siberian finds were so complete that full reconstructions of the mammoth could be made from life (there is a famous example in the Zoological Museum at Leningrad); and the flesh of some of the carcasses, when thawed, was fresh enough to be eaten by dogs, and even on one occasion to be served at a banquet to a party of Russian scientists.

The exact date of the woolly mammoth's extinction is unknown, but it certainly survived well into the Age of Man. It was familiar to our Stone Age ancestors, who hunted it with throwing-stones, spears, and pitfalls, and engraved its picture on the walls of their caves. Even after it was exterminated its bones gave rise to many picturesque legends of giants and dragons, and were regarded as incontrovertible proof that the Biblical deluge had actually occurred. Some of these facets of mammoth lore will be dealt with later when we consider elephants in their relationship to man. Meanwhile we must conclude this brief survey of proboscidean evolution with a discussion of some of the problems that have cropped up on the way.

CHAPTER TEN

Some Problems of Elephant Evolution

READERS WHO HAVE FOLLOWED ME patiently while I have tried to hack a pathway through the tangled jungle of facts relating to elephant evolution will have realized that even now many intriguing problems remain unsolved. The main pattern of the process is known, but a hundred details are still tantalizingly obscure. In this chapter, which is the last on the present aspect of my theme, I shall briefly consider just four of the problems implicit in the foregoing discussion. These are:

- (1) How did the elephant get its trunk?
- (2) What evolutionary cause produced the more extravagant forms of tusk?
- (3) Why did the proboscideans show in general a progressive increase in size?
- (4) Why has such a widespread and apparently prosperous group of mammals been brought to the verge of extinction?

The origin of the elephant's trunk is the simplest of these questions, and can be answered with a reasonable degree of certainty. I have considered the matter at some length in *Mermaids and Mastodons*, [43] and all that will be necessary here is to give a brief summary of the known facts. As has been said earlier, the ancestral elephant at the *Meritherium* stage of development did not possess a trunk. Like the Elephant's Child, "he had only a blackish, bulgy nose, as big as a boot, that he could wriggle about from side to side; but he couldn't pick up things with it". The absence of a trunk was no handicap to these early elephants, for they were comparatively small animals, and their heads were thus sufficiently near the ground

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for them to be able to deal quite easily with their food. But, for reasons that will shortly be discussed, the later elephants showed a progressive increase in size. Thus both *Palæomastodon* and *Phiomia* were somewhat larger than *Meritherium*, and the early mastodons and trilophodonts were already larger than any modern land animal except the elephant itself.

Now as the early proboscideans grew taller their heads grew farther and farther away from the ground, and it became progressively more difficult for them to reach their food. In other large animals this situation is usually dealt with by the development of a longer neck. But this was not possible in the proboscideans, for the evolutionary path along which they were progressing seems already to have committed them to exceptionally large heads. By the laws of mechanics any lengthening of the neck would have imposed such a strain on the neck muscles that the head would have become unmanageable, and the animal would have died out under the stress of competition, from its better-equipped rivals. In this *impasse* what alternative was left? The obvious answer lay in some elongation of the face which would span the gap between the mouth and the ground. This, in fact, is what occurred in *Trilophodon* and its even more specialized relations, the spoon-tusked and shovel-tusked. The lower jaw grew progressively longer, and at the same time the upper lip lengthened to a roughly equivalent extent. The animal could then use the lower jaw for rooting, scooping, or shovelling, and the flexible upper lip for tucking away the food thus obtained, and for squirting water down its throat.

As time went on the upper lip became more versatile, and developments in its musculature turned it into a powerful prehensile organ that could be used for food-gathering on its own. When this occurred the lower jaw would have been more hindrance than help, so it gradually receded. This stage is represented by the true mastodons and such descendants of the trilophodonts as the short-jawed *Stegomastodon* and *Cordillerion*. Eventually we reach the stage represented by the mammoths and the true elephants, where, far from being elongated, the face presents a flattened "bull-dogged" appearance, and all the work of food-gathering is done by the trunk alone. This story of the development of the elephant's trunk must be accounted one

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of the most fascinating and beautiful demonstrations of the workings of the evolutionary process known to science.

Turning to our second question, which deals with the evolutionary reason for the more extravagant forms of tusk, we seem at first to be on more difficult ground. With some proboscideans, of course, the tusks have an obvious adaptive function which can be explained quite simply by reference to the principles of natural selection. For example, the tusks of the *moeritheres* assisted these animals to feed, and those of the living elephants are of value as offensive and defensive weapons, or for such purely utilitarian purposes as stripping the bark from trees. Even the tusks of *Amebelodon* and *Trilophodon* were simply highly specialized feeding aids which, despite their grotesque structure, were essential to their owners' survival. But what are we to say of the many other bizarre forms of tusk that seem to have had no functional use? Of those of *Anancus*, for example, which sometimes grew so long and heavy that the animal must have had difficulty in moving its head; or the backward-curving tusks of *Dinotherium*; or the extraordinary spiral structures of the mammoths, whose crossing tips made them quite useless except perhaps as a somewhat inefficient guard for the trunk?

There are two main schools of thought concerning apparently useless, non-adaptive, structures. The first maintains that, in spite of appearances, these structures are adaptive after all, and seeks to support this opinion with possible explanations of their use. The second suggests that a point may be reached in the evolution of a species when specialization begins to run away with itself, and structures that have started on a particular path of development simply cannot stop following it until at last they become not a help but a hindrance to their owners, and may even lead to their extinction. Neither explanation is entirely satisfactory, and the second is particularly open to objection. The most powerful argument against it is that several groups of animals alleged to be handicapped by non-adaptive organs have nevertheless continued to flourish for very long periods. The classic example is the group containing the so-called sabre-toothed "tigers", or stabbing-cats. These animals had exceptionally long upper canines, which, it was alleged, although originally adaptive, gradually evolved to such gigan-

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tic proportions that the cat could not open its mouth sufficiently wide to feed, and therefore became extinct. Two unfortunate facts that the theorists seem to have disregarded in this connection are that the stabbing-cats existed successfully on the earth for over 40 million years, and that the earliest of the group, known as *Eusmilus*, had one of the longest canine teeth of them all. Certainly the proboscideans cannot provide such spectacular evidence as this, but it should be remembered that both *Anancus*, with its excessively long tusks, and the mammoths with their crossed-tipped tusks, had a very good evolutionary run lasting well over a million years.

In view of these facts are we then to support the first school of thought, and say that every structure, however useless it may appear, must have an adaptive function, because it can be shown that the species possessing it survives? I do not think that any reasonable person would be prepared to subscribe to such a view. There are too many structures and organs in animals, including some of those under discussion, which it would be absurd to suggest give their owner any possible evolutionary advantage. What, then, is the way out of the dilemma?

It should be remembered, first, that the evolutionary process is aimed at the survival of the species as a whole and not of its individual members as such; and, second, that extravagant developments do not normally occur until the individual animal is past middle age. Thus the explanation seems to be that the structures *are* adaptive in the young breeding animal, and only become useless or dangerous when it has reached an age that makes its individual survival a matter of no importance. For example, the young *Anancus*, at the height of its breeding powers, had the use of exceptionally long and powerful tusks, well adapted to the individual's evolutionary role at that time; only as it grew older, and increased growth led to fantastic overdevelopment, did it have to pay the price of its earlier advantage. Even in the African elephant of today a parallel, if less extreme, example can be seen. The young breeding bulls have well-developed, but not excessively long tusks, which are well adapted to their function; but an aged bull may have tusks which drag down its head with their weight and have become quite useless to it for any practical purpose. As with *Anancus*,

so with the mammoths. In youth the tusks were of obvious use as offensive or defensive weapons, their points being still well exposed; but in age they crossed, and became quite valueless except, as mentioned earlier, for the rather doubtful function of protecting the trunk. Even the enigmatical tusks of *Dinotherium* would have been more efficient stabbing weapons in the youth of the individual animal, before the points began to turn backward towards its own chest.

The development of these themes would swiftly lead us into the deeper waters of evolutionary theory, and to venture there would be inappropriate in the present context. We must turn instead to our last two problems: the reason why the proboscideans showed a progressive increase in size, and why, after their tremendous evolutionary flowering, they underwent such a catastrophic decline. It will be found that the subject matter of these two questions is closely interrelated.

A tendency towards the development of large forms is a common, though not universal, evolutionary trend. It is especially noticeable in certain marine forms, in the Mesozoic reptiles, and in the odd-toed and even-toed ungulates, as well as in the Proboscidea. The advantages of size are readily apparent. For instance, an animal that is a little larger than others of its kind will be slightly stronger and probably also slightly faster; also, if it lives in a cold climate, increased bodily bulk will give it a greater thermal efficiency. Our third question is thus easily answered. The proboscideans, in common with many other animals, grew steadily larger because size gave them an evolutionary advantage. The tendency towards greater bulk is a simple result of natural selection.

But that is not quite the whole of the story. Although size is in general an advantage, this is only true up to a certain point. The mechanical adaptations that have to be made to support a body larger than a certain critical size always demand serious sacrifices in other directions. The external circumstances of the animal's life may then suddenly change, and, being irrevocably committed to bulk, it may find that the survival value of this quality is now far outweighed by that of some of the others it has surrendered. Another factor to be borne in mind is the enormous intake of food required to keep a really large body

SOME PROBLEMS OF ELEPHANT EVOLUTION

machine in efficient operation. Animals above a certain size will have to spend a great number of their waking hours in eating, and will also be fatally susceptible to a sudden reduction in the food supply. Thus although, within limits, size is of survival value, undue specialization in this one advantage at the expense of the many alternatives will place an animal far more at the mercy of its environment than would otherwise be the case. While the environment is reasonably stable, well and good; but if it changes, extinction, or at best a rapid decline in numbers, will be the probable result.

The application of these general principles to the proboscideans is instructive, and will lead us to our last question. One of the mechanical adaptations made by every large member of the elephant family is the development of pillar-like legs. These are essential to support their owner's weight, but are no longer suitable for rapid locomotion. Now this, of course, is of no importance while the animal's enemies are of the kind to be deterred by bulk alone. As stated earlier in this book, only the young elephant need fear the attacks of lions and tigers, and even then it is largely protected by the presence of the herd. Nor can there ever be much danger of predators evolving to a sufficiently large size to threaten the adults, for there are survival factors inhibiting this development (large predators need more food, causing a rapid reduction of the prey and eventually their own extinction). But supposing a new predator appears on the scene, to whom size is no deterrent and slowness of gait in the quarry a positive advantage? Obviously there would soon be a very different tale to tell.

This has, in fact, occurred with the proboscideans. The new predator is man, who can easily keep up with an elephant, even on foot, and who finds its large size merely provides him with an easier target for his weapons. As stated in the last chapter, our ancestors were hunting the mammoth and the mastodon as early as the Old Stone Age, and in recent times the introduction of the sporting rifle led at first to a rapid decline in the two surviving species of elephant. Only during the last fifty years has a change in sentiment, backed by effective legislation, reversed this trend and put the elephant back on the upward path.

ELEPHANTS AS FOSSILS

The advent of the new predator, man, has of course only played a part in the decline of the elephant family for a comparatively short period of time. The great majority of proboscidean types had become extinct long before man was a factor to be reckoned with. The dangers of over-specialization, and particularly of excessive bulk, were the main cause of their disappearance. Any animal as large as an elephant is committed to a desperate race against time to ensure that its body factory is kept supplied with a sufficient quantity of fuel. It should be remembered that the two living species of elephants feed continuously for at least sixteen hours a day, during which time they may eat up to 6 cwt. of vegetation. The demands of some of the great proboscideans of the past such as *Mammuthus meridionalis* and *Mammuthus imperator* must have been even larger than this.

Now during the long history of the elephant family there have been widespread fluctuations of climate, which must have led on many occasions to serious shortages of food. It is easy to see how ill-equipped the proboscideans were to survive emergencies of this kind. For smaller creatures, especially carnivores, who can exist on one or two meals a day consumed in a very short space of time, the problem does not become acute till a much later stage; but a proboscidean's life must virtually be an everlasting meal or it dies of starvation. Even today graphic examples of this fact can still be given. I know of instances in Africa where seasonal food shortages have destroyed the succulent vegetation which forms the elephants' normal diet, compelling them to live on euphorbias and other plants from which they cannot obtain proper nourishment. Death usually occurs within a very short period.

Factors other than size have also played a part in the decline of the proboscideans. We have seen that some early members of the group were largely aquatic in habits, so that the onset of arid conditions would automatically have caused their destruction. The highly specialized lower jaws of some of the trilophodonts—*Amebelodon* and *Platybelodon* for example—would have rendered them extremely susceptible to environmental changes. Further dangerous specializations occurred in many other representatives of the order, which, if they had been subjected

SOME PROBLEMS OF ELEPHANT EVOLUTION

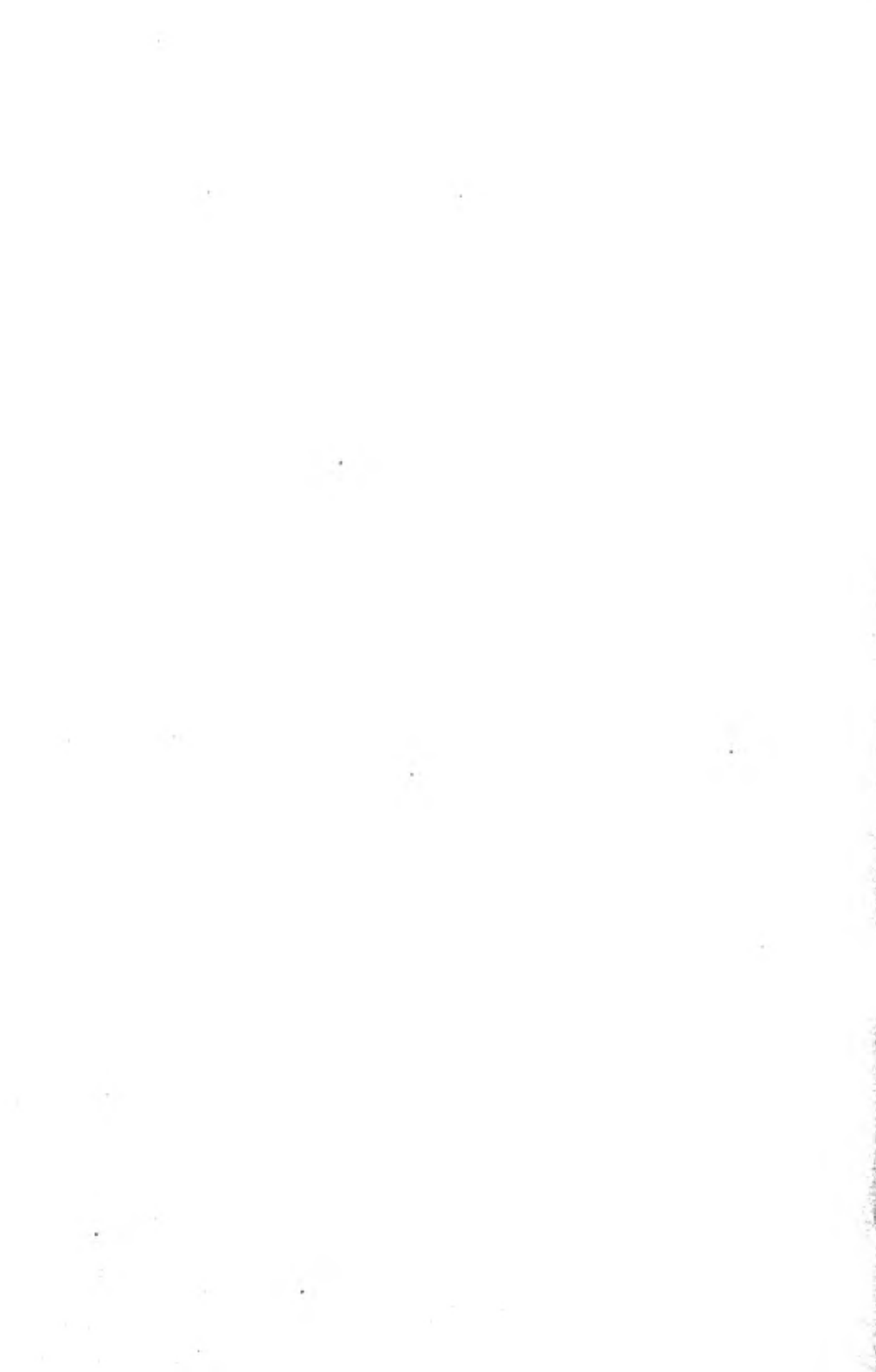
to undue external strains, would have been placed in danger of extermination.

Thus the answer to our last question can be said to lie in one main factor—over-specialization. Like many races of animals before them, the proboscideans made a variety of complex adaptations to their environment, of which a concentration on bulk was the most consistent and the most remarkable. At first an advantage, these specializations later became a handicap due to changes in climate and fluctuations of the food supply. The decline thus initiated by nature was speeded by the appearance of man as a new predator; but, even before his influence was felt, the once-successful, well-adapted proboscidean dynasty had been reduced to a mere handful of species. Man might have given the *coup de grâce*, and indeed for the mastodons and mammoths he probably did. Where the modern elephants are concerned he still seemed less than a century ago to be cast in the dubious role of Lord High Executioner. That this is no longer the case must always be held to his credit. It will also, I hope, be a comforting thought to readers of the third part of this book, where I propose to examine the role the elephant has played through more than fifty thousand years of human history.



PART 3

Elephants
and
Man



CHAPTER ELEVEN

Elephant Hunting

THE BASIC RELATIONSHIP between man and the elephant, as between his forbears and the mammoth and the mastodon, has been that of the hunter and the hunted. The main object of the first hunters in killing these animals was probably food, for the slaughter of a single mammoth or elephant would have kept a whole tribe supplied with meat for many days. But it was soon seen that a successful hunt could bring many other benefits. The hide of the mammoth was useful for making shields, and the ivory of the tusks could be fashioned into such things as fish-hooks and household implements. The thick pelts could be used as a protection against the cold, both as clothing and for covering the floors and entrances of caves.

The techniques employed by our early ancestors for hunting the mammoth, the mastodon, and the elephant can never be exactly known, but they probably resembled those of the primitive elephant hunting tribes of the recent past. In Africa particularly several hunting techniques still survive, or have only recently fallen into disuse, which would have been well within the capabilities of the men of the Old Stone Age. In Asia this is not the case, for most of its peoples have already enjoyed a long period of civilization.

The simplest and most effective of all elephant hunting methods, widely used in Africa until very recent times, is the pitfall (see Plate 24*a*). A pit with smooth sloping sides is dug across a path frequented by the quarry, and covered with branches and a layer of earth. One of the favourite places is at the approaches to a river, for elephants must drink each day, and there are often well-defined tracks leading to their watering-places. The pit is usually about 10 to 12 feet long by 6 feet broad at the top, and the sides converge to a point some 14 feet

below ground level. The way the pit is shaped causes the legs of the trapped elephant to be pinned together so that its movements are hampered, and escape becomes virtually impossible.

A variant of this type of trap consists of a rectangular or circular pit containing one or more upward-pointing stakes on which the animal is impaled. Pitfalls have now been made illegal in Africa because of the indiscriminate havoc they cause among protected game. But on a recent voyage up the Nile I found they were still secretly used for capturing elephant and hippo by the primitive riverine tribes of the southern Sudan.

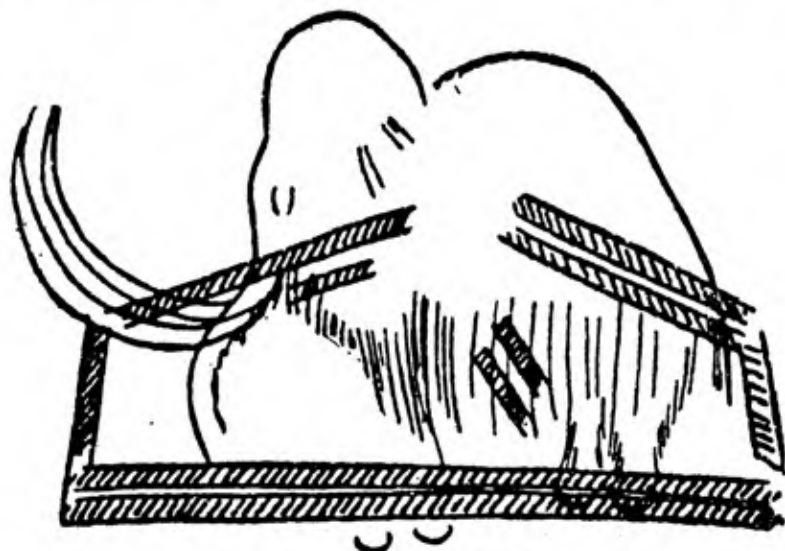
The supposed behaviour of elephants when one of their number falls into a pitfall was recorded by Pliny nearly two thousand years ago. In his *Natural History* (Book VIII, Chapter 8) he writes: "In Africa they take them in pit-falls; but as soon as an elephant gets into one, the others immediately collect boughs of trees and pile up heaps of earth, so as to form a mound, and then endeavour with all their might to drag it out." I wish I could confirm the correctness of this statement from personal observation, or produce reliable evidence from other travellers in its support; but I fear it must be regarded simply as one of those delightful legends which the elephant has always managed to inspire in the human imagination. What really occurs has been well described by Sir Samuel Baker, who was one of the most famous big-game hunters of the nineteenth century, and also (for in his case the paradox must be accepted) an acute and sympathetic observer of the animals he dedicated so much of his life to slaughtering. After describing the pitfalls which in his day were commonly found at the approaches to rivers, he continues:

The night arrives, and the unsuspecting elephants, having travelled many miles of thirsty wilderness, hurry down the incline towards the welcome river. Crash goes a leading elephant into a well-concealed pitfall! To the right and left the frightened members of the herd rush at the unlooked-for accident, but there are many other pitfalls cunningly arranged to meet this sudden panic, and several more casualties may arise, which add to the captures on the following morning when the trappers arrive to examine the position of their pits. The elephants are then attacked with

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spears while in their helpless position, until they at length succumb through loss of blood.[44]

The pitfall was probably the oldest of all forms of animal trap, and mammoths and mastodons as well as elephants must have fallen victim to it. But it seems possible that our ancestors had also learnt to devise more complicated traps which involved a certain knowledge of mechanical principles. For example, the



Mammoth in trap, from a Stone Age design in the Font-de-Gaume cavern in France

drawing above, which is copied from a Stone Age engraving in the Font-de-Gaume cavern in France, shows the outline of a mammoth on which has been superimposed an enigmatical tectiform design. Its significance has been variously interpreted by different authorities, and is still obscure; but one of the most reasonable explanations is that it represents some form of trap. If this is so, it would be consistent with our knowledge of other aspects of the hunting magic of primitive man. It was the custom of our ancestors to draw images of various animals of the chase on the walls of their caves in the belief that they would thereby gain power over the animals themselves. The introduction of

a symbolic trap into the picture would probably have been regarded as reinforcing the magic.

The possibility that Stone Age man had developed a fairly advanced form of mechanical trap is supported by the existence of similar devices among present-day primitive tribes. A typical example is the harpoon trap still widely used in parts of equatorial Africa. The main component in this is a heavy block of wood, to one end of which is attached a sharp metal harpoon. A rope made of lianas is attached to the block, and its loose end passed over a horizontal bough projecting over a well-known elephant path. The block is raised to a height of some 18 or 20 feet and the loose end of the rope is attached to a wooden bar supported across the path. The height of the bar is such that small animals will be able to pass beneath it, but an elephant will inevitably have to knock it aside. As soon as this happens the only restraining influence on the block is removed, and it falls with a rush towards the ground. If all goes according to plan, its great weight drives the metal harpoon deeply into the elephant's neck, either severing the spinal cord or penetrating the throat so that the animal bleeds to death. But the disadvantage of the trap is that, even with the most cunning placing, the block may only inflict a glancing blow without fatal results, or perhaps miss the target altogether.

One of the most effective but reprehensible methods of elephant hunting is by ringing them with fire. This practice is now illegal, and in all African territories under British control severe penalties are imposed on anyone who transgresses the law; but up to the second decade of this century it was responsible for the death of many hundreds, or even thousands, of elephants each year. I have never personally witnessed the immolation of elephants in a fire-ring, but Sir Samuel Baker has recorded a graphic picture of how the method works. He writes:

During the dry season, when the withered herbage from 10 to 14 feet in height is most inflammable, a large herd of elephants may be found in the middle of such high grass that they can only be perceived should a person be looking down from some elevated point. If they should be espied by some native hunter, he would immediately give due notice to the neighbourhood, and in a short time the whole population would assemble for the hunt. This

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would be arranged by forming a circle of perhaps 2 miles in diameter, and simultaneously firing the grass so as to create a ring of flames around the centre. An elephant is naturally afraid of fire, and it has an instinctive horror of the crackling of flames when the grass has been ignited. As the circle of fire contracts in approaching the encircled herd, they at first attempt retreat until they become assured of their hopeless position; they at length become desperate, being maddened by fear, and panic-stricken by the wild shouts of the thousands who have surrounded them. At length, half-suffocated by the dense smoke, and terrified by the close approach of the roaring flames, the unfortunate animals charge recklessly through the fire, burnt and blinded, to be ruthlessly speared by the bloodthirsty crowd awaiting this last stampede. Sometimes a hundred or more elephants are simultaneously destroyed in this wholesale slaughter. The flesh is then cut into long strips and dried, every portion of the animal being smoked upon frames of green wood, and the harvest of meat is divided among the villages which have contributed to the hunt. The tusks are also shared, a certain portion belonging by right to the various headmen and the chief.[45]

None of the methods of hunting so far described requires particular courage on the part of the hunter. But the same cannot be said of a practice observed by the Scottish explorer James Bruce in the early 1770's, shortly after he had reached the source of the Blue Nile. This was carried out by a particular section of the community known as *agageers** who were professional elephant and rhinoceros hunters. They lived in the woods, apart from the rest of the tribe, and scorned to touch any food that had not come from an animal slain with their own hands. They were dark-skinned but not black, with European features, and Bruce stresses that none of them had the curly hair of the typical negro. We can now be pretty certain that these men were either Arabs or Nubians, who, although they had doubtless intermarried with the local population, had preserved their own traditions and way of life. Bruce's description of the hunting methods of the *agageers* is sufficiently picturesque to deserve quotation at some length. He writes:

Two men, absolutely naked, without any rag or covering at all

* Captain Pitman tells me that the word is probably a corruption of *bagheera*, i.e. the Bagheera Arabs who still occupy that part of the country.—R. C.

about them, get on horseback; this precaution is from fear of being laid hold of by the trees or bushes, in making their escape from a very watchful enemy. One of these riders sits upon the back of the horse, sometimes with a saddle, and sometimes without one, with only a switch or short stick in one hand, carefully managing the bridle with the other; behind him sits his companion, who has no other arms but a broad-sword. . . . His left hand is employed grasping the sword by the handle, and about fourteen inches of the blade is covered with whip-cord. This part he takes in his right hand, without any danger of being hurt by it; and, though the edges of the lower part of the sword are as sharp as a razor, he carries it without a scabbard.

As soon as the elephant is found feeding, the horseman rides before him as near his face as possible; or, if he flies, crosses him in all directions, crying out, "I am such a man and such a man; this is my horse, that has such a name; I killed your father in such a place, and your grandfather in such another place, and I am now come to kill you; you are but an ass in comparison of them." This nonsense he verily believes the elephant understands, who, chased and angry at hearing the noise immediately before him, seeks to seize him with his trunk or proboscis, and, intent upon this, follows the horse everywhere, turning and turning round with him, neglectful of making his escape by running straight forward, in which consists his only safety. After having made him run once or twice in pursuit of the horse, the horseman rides close up along-side of him, and drops his companion just behind on the off side; and while he engages the elephant's attention upon the horse, the footman behind gives him a drawn stroke just above the heel, or what in man is called the tendon of Achilles. This is the critical moment; the horseman immediately wheels round, and takes his companion up behind him, and rides off full speed after the rest of the herd, if they have started more than one; and sometimes an expert Agageer will kill three out of one herd. If the sword is good, and the man not afraid, the tendon is commonly entirely separated; and if it is not cut through, it is generally so far divided, that the animal, with the stress he puts upon it, breaks the remaining part asunder. In either case he remains incapable of advancing a step, till the horseman returning, or his companions coming up, pierce him through with javelins and lances; he then falls to the ground, and expires with the loss of blood. . . .

Dextrous . . . as the riders are, the elephant sometimes reaches

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them with his trunk, with which he dashes the horse against the ground, and then sets his feet upon him, till he tears him limb from limb with his proboscis; a great many hunters die this way. Besides this the soil, at this time of the year, is split into deep chasms, or cavities, by the heat of the sun, so that nothing can be more dangerous than the riding.[46]

Several other methods of hunting the elephant on horseback were formerly practised in Africa, and many travellers have made reference to them. One of the best known of these involved the use of two horses and two hunters with broad-bladed spears. The first hunter would distract the elephant's attention while the second dismounted behind it and thrust his spear into the animal's entrails about two feet below the tail. The elephant would immediately swing round to face his attacker, who disappeared with all speed on horseback or on foot, whereupon the second hunter would make a similar attack. One or two stabs were usually sufficient to disembowel the animal, who was thereby immobilized and soon expired. This method of hunting used to be much in vogue among the Rizigat and Hamran Arabs, and at the beginning of the century it was being used to dispatch some 800 elephants a year.[47] Other Arab tribes on the southern fringes of the Sahara and in the Sudan used greater forces, pursuing elephants in posses of five or six mounted men armed with swords or long lances. The principle was the same, however: a decoy would capture the elephant's attention while one of the other hunters would either hamstring it or plunge a sword or lance into its vitals.

An even bolder method of hunting is still practised by the natives of certain parts of the Belgian Congo, particularly in the region of Ipanga-Batitu. The hunter goes alone and on foot, equipped solely with a heavy-bladed spear. He wears no clothes for fear they might catch on thorns or other obstructions, and he smears the whole of his body with dung to conceal the human scent. His object is to find a herd of elephants resting in the noonday heat, when circumstances are favourable for a stealthy approach. He next stalks his chosen animal, taking advantage of wind and cover, until he is within at most three or four yards of the creature's head. Then, at a single bound, he strikes,



Hunting the elephant with swords. From Holder (1886)

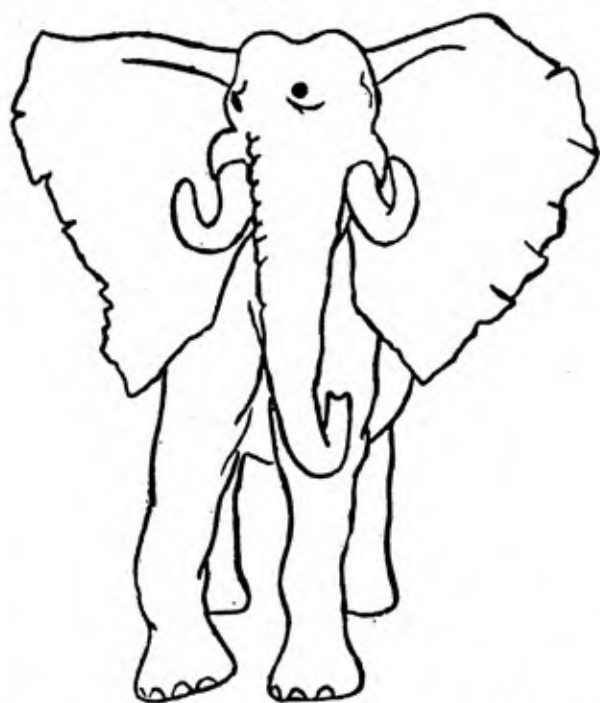
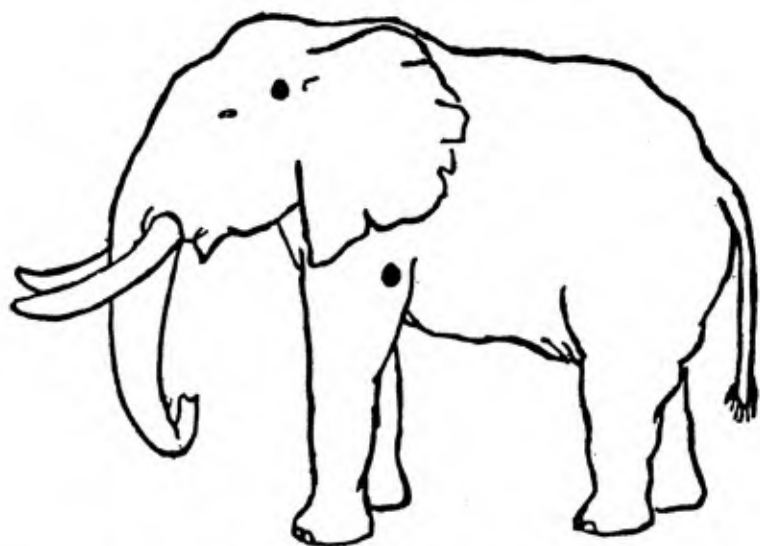
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plunging his spear either into the belly or the neck of the astonished animal; before it can gather its wits for retaliation he has dashed away into the bush. Surprise is the essence of the attack, and the spear must also be accurately placed in a vital part. If it goes home into the throat or the bowels the animal cannot normally survive for more than a few hours, and the hunter follows the blood trail until he comes upon the body. But too often in this method of hunting a misdirected blow will allow the quarry to escape; if this happens, not only does the hunter lose his prey but the animal may ultimately succumb to its wound after many days or weeks of suffering.

The Congo pygmies and, I believe, some other African tribes use the same technique, but normally work in groups of three or four instead of single-handed. The first hunter proceeds as for a solo attack, but then, as the elephant turns to run, the others dash in from several directions and likewise plunge swords or spears into its body. Anyone who knows African elephants in the wild will appreciate the astonishing courage required to bring a hunt of this kind to a successful conclusion.

Other methods of hunting elephants in Africa have included the use of poisoned arrows,[48] and of harpoons or heavy daggers dropped by hunters concealed in trees;[49] but so far as I can discover these techniques have not been practised now for many years. In fact, during the past century all the traditional native hunting methods have fallen into gradual disuse, at least where the pursuit of elephants is concerned. The reason for this has been partly the civilizing influence of the white man, who has opened up the unexplored regions of the continent, and partly the growing use of firearms, not only by the whites but by Arab and Indian ivory poachers and more recently by the natives themselves.

The rifle has wrought more havoc among the elephant population of Africa than any other weapon. It was introduced by the early explorers, and was later imported in bulk as an article of trade for sale to the natives. It has since been widely used by those wealthy amateurs of the chase who are generally known for some obscure reason as sportsmen. I am temperamentally averse to the killing and maiming of animals for pleasure, but



Where to shoot an elephant. The black dots mark the brain and the heart,
the only two vital target areas

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unfortunately no book on the elephant could claim to be complete unless it made some reference to the practice.

Owing to its poor vision an elephant is not difficult to approach, provided the hunter keeps downwind and moves with circumspection. The accidental breaking of a twig can sometimes be enough to alarm a whole herd and cause it to move off. A slight shift of wind can be equally disastrous, and many hunters carry with them a small tin of fine sand or dry ashes so that the wind direction can be constantly tested.

Even the most incompetent sportsman could hardly miss an elephant at the thirty-yard range which is normally considered appropriate, but it requires considerable skill to get a shot home in a vital spot. Books on big game hunting are usually provided with diagrams like those opposite showing where the hunter should aim, and it will be seen that in spite of the animal's size the two main target areas are unexpectedly small. For the beginner the heart shot is usually regarded as the most effective, but as he grows in prowess the hunter can hope to join the *élite* by despatching his quarry with a ball in the brain. A sportsman who is a dab at brain shots is always assured of a high degree of admiration from his fellows, while even those who specialize in hearts are not without their following. Less skilful hunters, whose bullets stray shamefully into the lungs, entrails, generative organs and other less effective parts of the target, where they cause the elephant great suffering without immediately killing it, are definitely beyond the pale. But unfortunately many hunters come within this class.

The heart shot is almost always taken from the side, and the region just above the heart is as fatal as the heart itself. If the bullet goes home, the elephant may run 200 yards or even more before falling. The brain shot is more immediately effective, but the target is difficult to hit owing to the network of air sinuses in the skull and the great mass of jaw bones, teeth and tusk sockets which protect the cranium. The shot may be taken from the front, between the elephant's eyes, or from the side between the eye and the orifice of the ear. A direct hit will drop the animal at once, and if elephants must be killed (which is unfortunately necessary for control purposes even if the dubious morality of sport is discounted) this is unquestionably the most

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humane way to do it. The rifle generally used has a bore of .375 or .450 mm., but experts may shoot with even smaller weapons. The notorious elephant hunter W. D. M. ("Karamojo") Bell once killed fifteen elephants in the same herd with rifles of bores .275 mm. and .303 mm. Larger rifles than the .450 mm. are sometimes used for control killing, but for sport this is not regarded as playing the game, being comparable to going after foxes with a sten gun.

A man who kills elephants from the painful necessity of reducing over-population or protecting human plantations from mischievous marauders has my sincere respect, and such hunters usually carry out their disagreeable task with efficiency and compassion. But the many books written by big game hunters show that too often a quite different spirit prevails. The following example taken from R. Gordon Cumming's *Five Years of a Hunter's Life in the Far Interior of South Africa* (1850) is typical of many. Although it is rather long I shall quote it in full to avoid any suggestion that I have misrepresented the sense by excisions. Cumming writes:

Presently, at a muddy fountain a little in advance, we took up the spoor of an enormous bull, which had wallowed in the mud and then plastered the sides of several of the adjacent veteran-looking trees. We followed the spoor through level forest in an easterly direction, when the leading party overran the spoor, and casts were made for its recovery. Presently I detected an excited native beckoning violently a little to my left, and, cantering up to him, he said that he had seen the elephant. He led me through the forest a few hundred yards, when, clearing a wait-a-bit,* I came full in view of the tallest and largest bull elephant I had ever seen. He stood broadside to me, at upwards of one hundred yards, and his attention at the moment was occupied with the dogs, which, unaware of his proximity, were rushing past him, while the old fellow seemed to gaze at their unwonted appearance with surprise.

Halting my horse, I fired at his shoulder, and secured him with a single shot. The ball caught him high upon the shoulder-blade, rendering him instantly dead lame; and before the echo of the bullet could reach my ear, I plainly saw that the elephant was mine. The dogs now came up and barked around him, but, finding himself incapacitated, the old fellow seemed determined to

* i.e. a kind of thorn tree.—R. C.

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take it easy, and, limping slowly to a neighbouring tree, he remained stationary, eyeing his pursuers with a resigned and philosophic air.

I resolved to devote a short time to the contemplation of this noble elephant before I should lay him low; accordingly, having off-saddled the horses beneath a shady tree which was to be my quarters for the night and ensuing day, I quickly kindled a fire and put on the kettle, and in a very few minutes my coffee was prepared. There I sat in my forest home, coolly sipping my coffee, with one of the finest elephants in Africa awaiting my pleasure beside a neighbouring tree.

It was, indeed, a striking scene; and as I gazed upon the stupendous veteran of the forest, I thought of the red deer which I loved to follow in my native land, and felt that, though the Fates had driven me to follow a more daring and arduous avocation in a distant land, it was a good exchange which I had made, for I was now a chief over boundless forests, which yielded unspeakably more noble and exciting sport.

Having admired the elephant for a considerable time, I resolved to make experiments for vulnerable points, and, approaching very near, I fired several bullets at different parts of his enormous skull. These did not seem to affect him in the slightest; he only acknowledged the shots by a "salaam-like" movement of his trunk, with the point of which he gently touched the wound with a striking and peculiar action. Surprised and shocked to find that I was only tormenting and prolonging the sufferings of the noble beast, which bore his trials with such dignified composure, I resolved to finish the proceeding with all possible despatch; accordingly I opened fire upon him from the left side, aiming behind the shoulder; but even there it was long before my bullets seemed to take effect. I first fired six shots with two-grooved, which must have eventually proved mortal, but as yet he evinced no visible distress; after which I fired three shots at the same part with the Dutch six-pounder. Large tears now trickled from his eyes, which he slowly shut and opened; his colossal frame quivered convulsively, and, falling on his side, he expired. The tusks of this elephant were beautifully arched, and were the heaviest I had yet met with, averaging 90 lbs. weight apiece.[50]

Although Cumming's book appeared more than a century ago the reader should not think that such things cannot happen nowadays. On a recent visit to Africa I heard tales which, if not

as revolting as the foregoing, were in the great tradition of the nineteenth-century big game story. And in several books published in the last decade it is possible to find records of hunting experiences fully as repellent as those of the earlier sportsmen. On the other hand, it is good to find that many white hunters now subscribe to the opinion of Sir Samuel Baker, who wrote as long ago as 1890: "There is no one who admires or is so foolishly fond of elephants. I have killed some hundreds in my early life, but I have learnt to regret the past, and nothing would now induce me to shoot an elephant unless it were either a notorious malefactor, or in self-defence." [51]

Baker was one of the more humane big game hunters, and he has recorded many interesting facts about the animals he felt constrained to shoot. One of his anecdotes describes the remarkable way in which an elephant recovered from the effects of a bullet. After shooting a particularly large elephant he decided that, while cutting up the flesh for his natives, he would make a post-mortem examination of its interior. He found an old wound still open where a bullet had entered the chest, missed the heart and lungs by inches, passed through the stomach and the body cavity beneath the ribs and flank, and come to rest at last in the great fleshy mass inside the thigh. He continues:

In that great resisting cushion of strong muscles the bullet had expended its force, and found rest from its extraordinary course of penetration. After some trouble, I not only traced its exact route, but I actually discovered the projectile embedded in a foul mass of green pus, which would evidently have been gradually absorbed without causing serious damage to the animal. To my surprise, it was my own No. 10 two-groove conical bullet, composed of twelve parts lead and one of quicksilver, which I had fired when this elephant had advanced towards me at night, forty-two days ago, and 22 miles, as far as I could ascertain, from the spot where I had now killed it. The superior size of this animal to the remainder of the herd had upon both occasions attracted my special attention, hence the fact of selection, but I was surprised that any animal should have recovered from such a raking shot. The cavity of the body abounded with hairy worms about 2 inches in length. These had escaped from the stomach through the two apertures made by the bullet; and upon

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examination of the contents, I found a great number of the same parasites crawling among the food, while others were attached to the mucous membrane of the paunch. This fact exhibits the recuperative power of an elephant in recovering from a severe internal injury.[52]

Of course hunters do not always have things their own way in dealing with elephants, and many a foolhardy sportsman has been charged, with fatal results. The charge is a magnificent and terrifying spectacle, but one it is prudent to deny oneself if one can possibly avoid it. Elephants rarely charge unless persistently persecuted, but a badly placed shot which hits an animal without incapacitating it may often cause it to come for the hunter. Occasionally elephants will charge entirely unprovoked, and it is by then too late even for the unarmed naturalist or the friendly photographer to explain that he has no hostile intent. For this reason all wild elephants are best given a very wide berth.

Cows usually charge with the ears pressed close to the head; the bulls carry them stretched out sideways like sails. In thick bush, where the trunk could be damaged by thorns and other vegetation, it is rolled up during the charge, but in open country it is usually carried straight in front of the animal. This helps the elephant to scent his adversary and hunt him down. The tail is cocked high, as in nearly all animals going through an aggressive display.

As stated in Part I of this book, the charge cannot be maintained for great distances, but a man could not hope to outstrip an elephant in open country where there was no possibility of concealment. According to some hunters a single shot will invariably turn a charging elephant, even if it misses a vital spot; others say this is by no means the case. In the African game parks, where I have done most of my elephant watching, rifles are of course forbidden, so I could never put the matter to the test. In any case a hasty retreat in a fast car seems to me a much more intelligent, if inglorious, way of dealing with an angry elephant than to destroy it for obeying its natural instincts.

Of course elephants were hunted by civilized men long before the advent of modern firearms, and the history of the sport goes

back to very ancient times. The main objects of the chase were to obtain ivory and to capture female elephants for domestication, but it is certain that hunts were also organized for the pleasure of royal personages. Thus an Egyptian papyrus dating from the fifteenth century B.C. tells how Thutmose III went hunting for elephant, possibly on the Nile,* and on one occasion tackled a herd a hundred and twenty strong. He was charged by the largest elephant, and was only saved from death by a hunting companion, one Amen-en-Heb, who cut off the elephant's trunk with his sword.[53] Both Assurnasirpal II and Shalmaneser II hunted for sport in Syria, where elephants lived in the early part of the first millennium B.C. Assurnasirpal particularly distinguished himself by killing thirty elephants and capturing several more alive for his zoological garden. The elephant later became extinct in this area, probably as a result of the enthusiasm of the Assyrian kings for the chase.

To conclude this chapter a few words must be said about the use of the various commodities provided by the carcase. The flesh is said to be gastronomically unrewarding, being rather sickly to the taste and very sticky. Nevertheless, the first African explorers found it was much prized by the natives, the heart being considered a particular delicacy. Of the Asiatic elephant, Tennent writes: "The flesh is occasionally tasted as a matter of curiosity: as a steak it is coarse and tough; but the tongue is as delicate as that of an ox; and the foot is said to make palatable soup." [54] But these judgements are made by civilized standards, and to primitive man every part of an elephant or mammoth would have been regarded as a welcome addition to the food store.

Apart from food, the elephant carcase is put to a number of other uses, especially in Africa. The skin is still used for ceremonial shields and in the manufacture of household furniture. The fat of the internal organs is boiled down for use in cooking and occasionally for burning in oil lamps (although the importation of paraffin has now made this last practice almost obsolete). The hairs of the tail are made into bracelets and are

* According to J. H. Breasted, quoted by Deraniyagala (*Some Extinct Elephants, their Relatives, and the Two Living Species*, 1955, p. 116), the hunt took place on a tributary of the Euphrates known as the Sejur.

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much prized as charms. The feet are also occasionally transformed into umbrella stands, and a worthy example can be seen in wet weather appropriately fulfilling its function outside the Director's office at the London Zoo.

The most important of all commodities obtained from the elephant carcase is, of course, ivory. Even in prehistoric times it ranked second only to food as a motive for hunting the elephant, the mastodon and the mammoth. The first true men of the Old Stone Age, and particularly of the Aurignacian period, used mammoth ivory for making fish hooks, arrow straighteners and other implements. Sometimes the implements were engraved with designs or representations of animals, so that ivory can claim to be one of the first materials used as a medium for artistic expression.

In the days of the first civilizations ivory was in great demand for making ornaments and furniture. Even palaces and houses were built of it according to the Old Testament,[55] and there are other Biblical references to its use in the manufacture of thrones, benches, and beds. Herodotus refers to the importation of ivory into ancient Egypt, and Pliny says that in the savage land to the south it was so plentiful that the natives used it for door-posts, fencing, and stalls for cattle. The Greeks had a passion for it and the great sculptor Pheidias, who lived in the fifth century B.C., used to make gigantic statues of ivory and gold. That of Minerva in the Parthenon was nearly 40 feet high, and the seated colossus of Jupiter at Olympia was 58 feet high.[56] In ancient Rome ivory was used for sculpture and for domestic purposes. A fine sculptured head found in the Roman theatre at Vienne in the Rhône valley can still be seen in the town's museum, and there are several ivory figurines of the early Roman period in the British Museum.

The ivory cult continued undiminished under the christianized Roman Empire and, after a period of decline during the Dark Ages, enjoyed a new resurgence in medieval times. From the middle of the thirteenth to the middle of the fourteenth century many masterpieces of Gothic ivory carving were produced in western Europe. These were mainly of religious subjects, such as the groups showing the Coronation of the Virgin and the Descent from the Cross in the Louvre, or the diptychs

and reliefs of the Passion in the Victoria and Albert Museum. At the same time there was a great increase of ivories for domestic use. Caskets, mirror cases, and combs were produced by the hundred, many of them ornamented with delightful pastoral scenes of love-making, elopements, and other episodes drawn from the medieval romances. A fine example of these is the Lancelot and Guinevere mirror case at Liverpool.

With the coming of the Renaissance the power of the Church was on the wane, and there was an increasing emphasis on profane subjects. But there was still an insatiable demand for ivory, especially in Germany and Flanders, where the best work of the period was done. The demand has continued right down to modern times, not only for use in creating works of art but for such purely utilitarian purposes as the manufacture of billiard balls and piano keys. There has also been a continuous demand for ivory in China and Japan, countries where the art of ivory-carving has been pursued with even greater enthusiasm than in western Europe.

To supply all these markets over such a long period has naturally caused an enormous drain on the world's elephant population. It was recognized at a very early stage that the tusks of the African elephant were more suitable for ivory-carving than those of the Asiatic, so it is the former animal that has suffered most from the trade. Cow ivory is also generally regarded as being superior to that of bulls, being of closer grain, and this has encouraged a disproportionate slaughter of the female animals. The introduction of firearms greatly accelerated the holocaust, and Arab ivory traders waxed fat on the proceeds of the vast number of tusks they used to send to the great collecting centres at Khartoum and Zanzibar.

By 1900 it was becoming apparent that the African elephant was in danger of extinction. Accordingly, various colonial administrators of the time, encouraged by the example of Sir Harry Johnston in Uganda, took steps to protect it. The way the protective legislation has worked will be discussed at some length in the final chapter of this book. Here it will suffice to say that the over-hunting of elephants, whether for food, ivory,



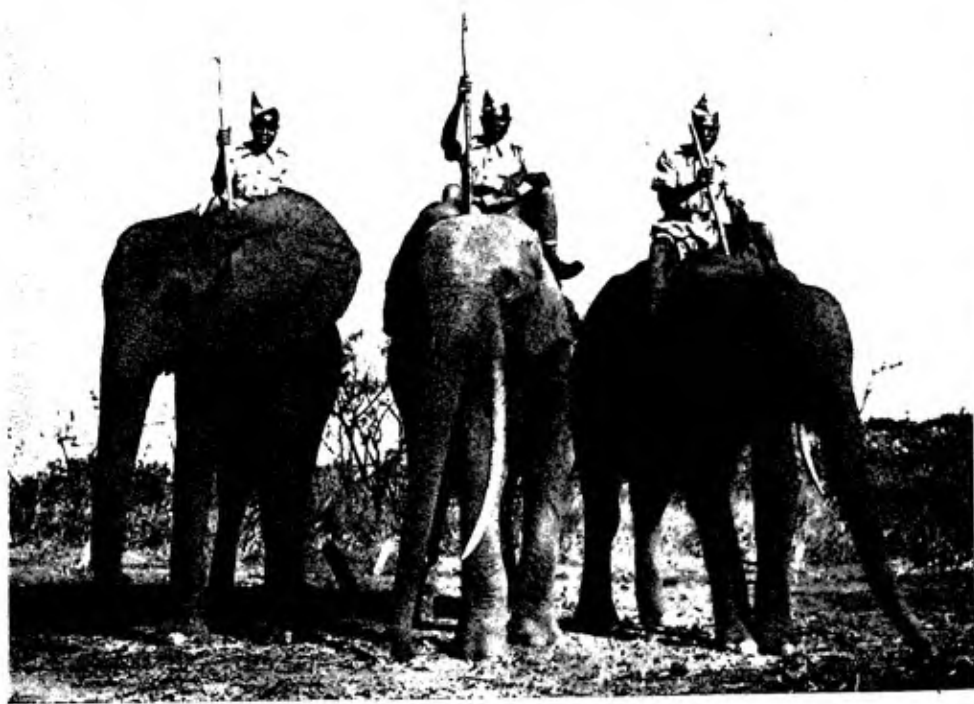
13 a) A newly-captured wild Asiatic elephant

b) Indian elephant used in tiger hunting. From Jardine (1836).
Note the erroneous drawing of hocks on the hind legs





14 a) Elephant at work, Lampang, Thailand
b) Domesticated African forest elephants, Belgian Congo



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sport, or any other purpose, appears at last to be under control. After many years of callous indifference man seems ready to make amends to the elephant for at least some of the cruel and stupid acts of the past.

CHAPTER TWELVE

Elephants as Servants of Man

THE GREAT SIZE and strength of the wild elephant would not at first suggest that it would take readily to human domination; yet elephants have been domesticated for many thousands of years. Of the two living species the Asiatic has proved more docile, but the belief that the African is untameable is not correct. In fact, the African elephant was domesticated quite as early as the Asiatic, and was the first to make an impact on western European civilization. Had mammoths and mastodons survived into a period of more advanced culture there seems no reason why these animals also might not have been harnessed to human use.

The earliest historical evidence for the domestication of the elephant comes from India, where the animal is depicted on seals dating from the second millennium B.C. On several of these the elephants are shown with a line extending from the top of the back to just behind the foreleg. As the natural conformation of the elephant's skin does not show a fold at this place, it is reasonable to assume that the line represents the forward edge of some kind of saddle or drapery. Certainly by the time of the Greek conquest of India the elephant was widely used there as a domesticated animal. It is frequently figured on coins, and terra-cotta models of elephants with mahouts, or elephant drivers, on their backs have survived from the fourth century B.C. The elephant was also used in war at this time, for a coin commemorating the Battle of the Hydaspes in 326 B.C. shows Alexander the Great on horseback attempting to spear King Porus of the Punjab, who is riding on an elephant.

In Africa there is no certain evidence of domesticated elephants before the Ptolemaic period, but it seems likely that

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they must have been captured and tamed in the Nile valley during early dynastic times. The elephant of this region, whose range extended along the North African coast and right down the Atlantic seaboard, was almost certainly not the large bush elephant of East Africa, but an animal of the same size as the forest elephant. This fact has been deduced from the relative size of the elephants and their riders shown on seals.

The earliest reference in European literature to the domestication of elephants occurs in the fourth century B.C. in Book IX of Aristotle's *Historia Animalium*. He writes:

Elephant-hunting is conducted in the following way: men mount upon some tame courageous animals; when they have seized upon the wild animals they command the others to beat them till they fail from fatigue. The elephant-driver then leaps upon its back and directs it with a lance; very soon after this they become tame and obedient. When the elephant-drivers mount upon them they all become obedient, but when they have no driver, some are tame and others not so, and they bind the fore legs of those that are wild with chains, in order to keep them quiet. They hunt both full-grown animals and young ones.[57]

Pliny likewise makes reference to this method of capturing elephants in Book VIII of his *Natural History*, and then continues:

It was formerly the practice to tame them by driving the herds with horsemen into a narrow defile, artificially made in such a way as to deceive them by its length; and when thus enclosed by means of steep banks and trenches, they were rendered tame by the effects of hunger; as a proof of which, they would quietly take a branch that was extended to them by one of the men.[58]

In the East in more recent times the most important method of capturing elephants has been in *keddahs*, or corrals. These vary in pattern, but the principle in each case is the same. The *keddah* is simply a large stockade, either triangular or rectangular in shape, with a funnel-shaped opening at one end into which the animals can be driven. In the triangular pattern the funnel is formed by extending two sides of the triangle beyond its base for several hundred yards; the base itself contains an opening, known as the *kan gula* or "ear hole". The stockade is

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made of tree trunks, and the *kan gula* can be closed by means of a rolled curtain of logs some five or six inches in diameter, raised like a portcullis above the entrance. The area enclosed by the stockade is known as the *kelina gala*, or "play pen", and must contain a pond or stream as well as a good acreage of jungle.

Before beginning operations a thousand men or more must be rounded up from the local villages to act as scouts and beaters. The dry season is usually chosen, as the herds are then concentrated round the limited perennial watering places. The scouts scour the neighbourhood for a good herd and, when this is found, the beaters are arranged round it in the form of a rectangle. Each section of the rectangle is composed of men from a particular village, superintended by their own headman. When the elephants are completely enclosed any streams lying between them and the *keddah* are so far as possible diverted. The object of this is to keep the animals thirsty so that the attraction of the water in the *kelina gala* will encourage them to go in. The director of the beat then orders the whole rectangle to move slowly towards the entrance of the *keddah*. With luck this may be fairly close, but sometimes it may be twenty or thirty miles distant, and the beat may take anything from three weeks to two months according to the nature of the terrain. If the *keddah* is very far away it is sometimes more economical to build a new one nearer at hand. In either case it is important that the rectangle of beaters should be sufficiently large for the elephants not to panic and attempt to break out, and for the same reason the speed of advance must often be frustratingly slow. When the *keddah* is reached, one side of the rectangle breaks formation, and the men make two new lines running to each wing of the funnel. The elephants are now enclosed by the two wings of the *keddah* and three sides of the human rectangle. The men then resume their advance until eventually the elephants pass into the *kelina gala*. They seldom seem to object to this, being attracted by the water beyond, and anxious to escape from the beaters who are by this time encouraging them forward with yells and shots from blank cartridge pistols. As soon as the last animal has passed through, the log curtain is released and the herd is imprisoned.

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The next step is to secure the individual animals of the herd preparatory to training. For this purpose tame decoy elephants with mahouts are employed. These enter the stockade, the mahout on the neck, and behind him another man who has the daring job of putting a noose round the wild elephant's leg. The elephants are by this time deeply disturbed, and may make attempts to escape from the stockade. A concerted charge would, of course, release the whole herd, and the fact that this is never attempted underlines the elephant's lack of intelligence. An individual may sometimes try his strength against the palisade, and Sanderson described how he once watched a determined tusker go straight through the barrier as if it were made of cornstalks. But even then none of the others attempted to follow their leader, and the gap was speedily repaired.[59]

To noose an elephant it must first be separated from the main herd. At this stage the captive elephants are usually too frightened to show an aggressive spirit, and it is rare for them to attack the mahouts or the noosers. The main exceptions are cows with calves, who will sometimes roar with fury and make determined efforts to keep the tame elephants at bay. As soon as an elephant has been headed off from the herd by one or more of the tame animals, the nooser steps to the ground and approaches it on foot, concealed beneath the belly of his own mount. When he is sufficiently close he darts out, slaps the elephant's hind foot and, as it lifts its leg, quickly slips on the noose. It is essential to noose the hind foot and not the fore-foot, or the elephant will be likely to fall and do itself harm. The free end of the noose is attached to the collar of the tame elephant, which leads the captive to a nearby tree, to which it is tethered. There may be some opposition to this operation, and the unfortunate captive may have to be butted by other tame elephants from behind. Sometimes it kneels or lies down in defiance, and must then be coaxed to its feet, for to drag a recumbent elephant along the ground will almost certainly injure it. Apart from such passive resistance the noosed elephant may decide to make a do or die fight for its freedom. P. E. P. Deraniyagala describes how an elephant cow at the Panāmūrē *keddah* in 1944 administered a swift uppercut with her right fore-leg to the tame elephant's chin. The blow landed squarely

on the target, and the noise of the unfortunate recipient's lower jaw meeting its upper could be heard from a distance of thirty yards.[60] The captive can also use its teeth to good effect, and will attempt to bite off the trunk-tips and tails of its tormentors. A really obstreperous animal may need three tame elephants to deal with it. One on either side presses on the ribs with the base of the trunk, thus keeping the victim short of wind, while the third encourages it forward from behind. A tame tusker can often deal very efficiently with a difficult captive, holding its head with the under surface of its tusks as firmly as in a vice.

The *keddah* is undoubtedly the best, and in fact the only, method of capturing elephants in large numbers, but several other techniques are employed in the East when only a single captive is sought. One of these, requiring particular daring, was practised in Ceylon in the last century by the professional elephant catchers known as *panickeas*. These inhabited the Moorish villages in the north and north-east of the island, and their calling was handed down from father to son for many centuries. The elephants they obtained were put into the hands of Arab trainers, and eventually exported to southern India for ceremonial use by the native princes.

Sir James Emerson Tennent made a study of the work of the *panickeas*, and has left an interesting record of his impressions. He writes:

The ability evinced by these men in tracing elephants through the woods has almost the certainty of instinct. . . . So keen is their glance, that like hounds running "breast high" they will follow the course of an elephant, almost at the top of their speed, over glades covered with stunted grass, where the eye of a stranger would fail to discover a trace of its passage, and on through forests strewn with dry leaves, where it seems impossible to perceive a footstep. Here they are guided by a bent or broken twig, or by a leaf dropped from the animal's mouth, on which the pressure of a tooth may be detected. If at fault, they fetch a circuit like a setter, till lighting on some fresh marks, they go a-head again with renewed vigour. So delicate is the sense of smell in the elephant, and so indispensable is it to go against the wind in approaching him, that on those occasions when the wind is so still that its direction cannot be otherwise discerned, the *Panickeas*

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will suspend the film of a gossamer to determine it and shape their course accordingly. . . .

So fearless and confident are they, that two men, without aid or attendants, will boldly attempt to capture the largest-sized elephant. Their only weapon is a flexible rope made of deer's or buffalo's hide, with which it is their object to secure one of the hind legs. This they effect either by following in its footsteps when in motion or by stealing close up to it when at rest, and availing themselves of its well known propensity at such moments to swing the feet backwards and forwards, they contrive to slip a noose over the hind leg.

At other times this is achieved by spreading the noose on the ground partially concealed by roots and leaves beneath a tree on which one of the party is stationed, whose business it is to lift it suddenly by means of a cord, raising it on the elephant's leg at the moment when his companion has succeeded in provoking him to place his foot within the circle, the other end having been previously made fast to the stem of the tree. Should the noosing be effected in open ground, and no tree of sufficient strength be at hand round which to wind the rope, one of the Moors, allowing himself to be pursued by the enraged elephant, entices him towards the nearest grove; where his companion, dexterously laying hold of the rope as it trails along the ground, suddenly coils it round a suitable stem, and brings the fugitive to a stand-still. On finding himself thus arrested, the natural impulse of the captive is to turn on the man who is engaged in making fast the rope, a movement which it is the duty of his colleague to prevent by running up close to the elephant's head and provoking the animal to confront him by irritating gesticulations and taunting shouts of *dah! dah!* a monosyllable, the sound of which the elephant peculiarly dislikes. Meanwhile the first assailant, having secured one noose, comes up from behind with another, with which, amidst the vain rage and struggles of the victim, he entraps a fore leg, the rope being, as before, secured to another tree in front, and the whole four feet having been thus entangled, the capture is completed.

A shelter is then run up with branches, to protect the captive from the sun, and the hunters proceed to build a wigwam for themselves in front of him, kindling their fires for cooking, and making all the necessary arrangements for remaining day and night on the spot to await the process of subduing and taming his rage.[61]

Other methods of capturing elephants alive are the decoy and the pitfall. In the former a female elephant is tethered in an enclosure to entice a wild bull, the entrance being closed as soon as he has gone inside. The pitfall method is similar to that described in the previous chapter, but is unsatisfactory for capturing elephants for domestication owing to the danger of the animal injuring itself when it falls. To allow the captive out of the pit the elephant-catchers throw down logs and brushwood until the floor-level is raised to that of the surrounding ground. Ropes are slipped round the animal's neck and leg just before the floor is sufficiently high for it to step out. Another variant of the noosing method is to dig a shallow pit some 8 to 12 inches deep and 3 feet in circumference on a path frequented by elephants. This is roofed with bamboos and other vegetation and a circular noose is laid on top of it. To the free end of the noose it attached a heavy piece of timber. Any elephant stepping on the concealed pit will go through the flimsy surface, thus tightening the noose round its leg. The piece of timber will then impede its progress by wedging itself against trees and bushes, so that the elephant catchers can easily track it down and secure it with further ropes.

Yet another method formerly practised in the East was the use of drugged food, opium being the main agent employed. The food was laid in the elephant's path, and if swallowed would render the animal comatose so that it could be easily secured. The disadvantages of this method were that the food was not always eaten, and that, if it were, the elephant might get some distance away before falling into a coma; it would thus often be difficult to find. Also more opium was needed to drug a single elephant than to keep an opium den running for a week; as the latter use of the substance was equally profitable it was generally preferred.

William Bazé in *Just Elephants* (1955) has given an account of one of the most exciting methods of elephant capture—hunting by lasso. He spent many years with Bao Dai, the former Emperor of Vietnam, breaking in wild elephants, and participated in many of the hunts himself. Hunting by lasso is really a variant of ordinary noosing, but without first getting the animals in a *keddah*. It is conducted with tame elephants,

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which are divided into three sections: fighters, beaters, and captors. A typical number for a hunt is fifteen, made up of five teams of three. The fighter elephants carry only one man, all the others two. The man who does the actual lassoing sits on the neck of the captor elephant. He carries a long stick, to the end of which is attached a noose of rope made from twisted strands of buffalo or ox hide; the free end of the rope, which must be some 25 yards long, is coiled on the tame elephant's back. The object of the hunt is to close in on a selected elephant in a herd, get the noose round one of its hind legs, and tie the free end to a tree.

Theoretically, one wild elephant should be caught by each of the five teams at each sortie, but in practice the average is only three. Trackers first locate the position of the herd, and the hunters then approach downwind. Small herds of twenty or thirty animals can be attacked from any side, but with a large herd of a hundred or more to attack from the front would be extremely dangerous; the attack is therefore generally made from the flank. Each team selects its own elephant and the operation proceeds as follows. First each beater begins to pursue the animal its team has marked down for capture. The beaters are chosen specially for their speed and stamina, being usually females or young males, and their size and strength are secondary considerations. Their role is to wear down the quarry and to keep it from escaping into the jungle, where the captors could not follow without danger of being brained by overhanging branches. The fleeing elephant gradually tires, and its pace becomes slower and slower. When this happens the beater makes way for the captor, who comes up so close that his forehead is pressing against his victim's rump. The hunter then prepares his lasso and with a deft flick secures it round one of the hind legs of the retreating elephant. His assistant gradually pays out the rope, and then keeps distance while the beater reverses his former tactics and heads the quarry towards the nearest patch of jungle. As soon as the elephant reaches cover the assistant on the captor elephant slips off its back and secures the free end of the rope to a large tree. Sometimes, when the captive feels the jerk of the rope, he turns furiously on his pursuers to make a last frantic attempt at escape. This is where

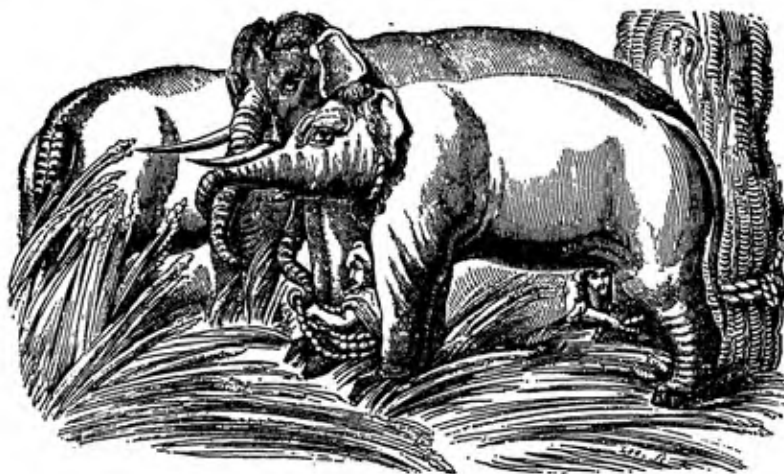
the third member of the team, the fighter, comes in. Chosen for his strength and toughness, he holds off the attacks of the victim while the hunter's assistant escapes. He then stands by to subdue it in case it should show any further signs of aggression. This is really the end of the hunt, the elephant being coaxed into some degree of subservience on the scene of its capture, and then led off by tame elephants for training in the usual way.[62]

The last method of capturing elephants which I shall have space to describe here is a somewhat reprehensible one, for it involves the betrayal of the male elephant by a party of unscrupulous females. The method is particularly suitable for capturing large solitary bulls who are too wary and too formidable to be taken by more conventional means. Five or six trained cows known as *koomkies* are assembled together and sent out with mahouts lying flat on their necks partially concealed by dark-coloured blankets. They go to the part of the jungle where the single male, who is called a *goondah*, or *saun*, is known to be, and attempt to ingratiate themselves with him by the stratagems peculiar to their sex. Sometimes a male will have his suspicions aroused by the scent of the concealed mahouts, but more often he does not seem to notice it. This is an odd fact when one remembers the elephant's exceptionally keen sense of smell; but the attentions of a band of provocative females, all intent upon seducing him, are probably enough to turn the stolidest elephant's head so that he becomes careless of danger. The females keep company with their intended victim for several days, until he comes to accept them as fellow inhabitants of the wild. They are withdrawn one by one every few hours so that their mahouts can be changed out of sight of the quarry. The capture is effected when the *goondah* has fallen into a deep doze. To make sure that he is sufficiently somnolent (for elephants are normally light sleepers), the elephant hunters first keep him from sleeping at all for several days. This is achieved by moving the females off every time he begins to doze, when he will usually follow so as not to lose company with them. At last he falls sound asleep and the treacherous Delilahs close in from every side. Provided the *goondah* remains asleep they have little work to do; but if he shows signs of waking they caress him with their trunks, and lull him into a sense of false security. Meanwhile two mahouts

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slip from the backs of their mounts and lash the hind legs of the elephant firmly together. The comatose animal is then helpless, and according to Sanderson, who witnessed this method of hunting in India, the mahouts can seldom resist waking their captive with an affectionate slap on the backside, telling him to be of good cheer.[63]

The scene following upon this indignity can better be imagined than described. The astonished elephant wakes with a start to see himself surrounded on all sides by the delighted



Treacherous female decoys assisting in the capture of a goondah.
From *The Menageries* (1831)

mahouts, while the perfidious females who have been the cause of his undoing smile to themselves enigmatically like elephantine Mona Lisas. The captive trumpets with fury and dismay, and does his best to make off into the jungle, dragging his pinioned hind legs behind him. But his efforts are useless, and eventually he gives up his attempt at flight and sinks exhausted to the ground. The men then approach once more and shackle him more firmly with chains, or rope him to a nearby tree. When his first disquiet and anger have subsided, a rope is tied round his neck and, with hind legs hobbled, he is led away to a local station to be trained. One would think that an experience of

this kind would be sufficient to put an elephant off female society for life, but such is the forgiving nature of the animals that the bull is soon working alongside the very cows who have brought about his downfall, and even perhaps showing his forgiveness by bringing one of them to bed of a fine calf.

The training of elephants is a highly specialized business, and those who practise it often have a long traditional association with the craft. In India and other parts of the East many families can boast of a line of elephant-trainers going back for several generations. The first stages of training as practised in medieval times are described in the fifth chapter of the *Mirabilia Descripta* of Jordanus de Severac, published in 1330. The passage, which refers to the taming of elephants in Cambodia, is quoted by Tennent in *The Wild Elephant*; it first describes the method of capture, and then continues as follows:

Then cometh a man clothed in black or red, with his face covered, who cruelly thrashes him from above, and crieth out cruelly against him as against a "thief!" and this goeth on for five or six days: without his getting anything to eat or drink. Then cometh another man with his face bare and clad in another colour, who feigneth to smite the first man, and to drive and thrust him away. Then he cometh to the elephant and talketh to him, and with a long spear he scratcheth him, and he kisses him and gives him food. And this goes on for ten or fifteen days, and so by degrees he ventureth down beside him and bindeth him to another elephant. And then after twenty days he may be taken out to be taught and broken in.[64]

Since these early days two main techniques have been used for training elephants, which we may call respectively the tough and the gentle. The former method simply consists of setting an elephant to work and beating him until he does what is expected of him. Apart from any moral considerations this is a stupid method of training, for it produces a resentful animal who at a later stage may well turn man-killer. The gentle method requires more patience in the early stages, but produces a cheerful, good-tempered elephant who will give many years of loyal service.

The first essential in elephant training is to assign to the animal a single mahout who will be entirely responsible for the

job. Elephants like to have one master just as dogs do, and are capable of a considerable degree of personal affection. There are even stories of half-trained elephant calves who have refused to feed and pined to death when by some unavoidable circumstance they have been deprived of their own trainer. Such extreme cases must probably be taken with a grain of salt, but they do underline the general principle that the relationship between elephant and mahout is the key to successful training.

The most economical age to capture an elephant for training is between fifteen and twenty years, for it is then almost ready to undertake heavy work and can begin to earn its keep straight away. But animals of this age do not easily become subservient to man, and a very firm hand must be employed in the early stages. The captive elephant, still roped to a tree, plunges and screams every time a man approaches, and for several days will probably refuse all food through anger and fear. Sometimes a tame elephant is tethered nearby to give the wild one confidence, and in most cases the captive gradually quietens down and begins to accept its food. The next stage is to get the elephant to the training establishment, a ticklish business which is achieved with the aid of two tame elephants roped to the captive on either side.

When several elephants are being trained at one time it is customary for the new arrival to be placed between the stalls of two captives whose training is already well advanced. It is then left completely undisturbed with plenty of food and water so that it can absorb the atmosphere of its new home and see that nothing particularly alarming is happening to its companions. When it is eating normally its own training begins. The trainer stands in front of the elephant holding a long stick with a sharp metal point. Two assistants, mounted on tame elephants, control the captive from either side, while others rub their hands over his skin to the accompaniment of a monotonous and soothing chant. This is supposed to induce pleasurable sensations in the elephant, and its effects are reinforced by the use of endearing epithets, such as "ho! my son", or "ho! my father", or "my mother", according to the age and sex of the captive.[65] The elephant is not immediately susceptible to such blandishments, however, and usually lashes out

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fiercely with his trunk in all directions. These movements are controlled by the trainer with the metal-pointed stick, and the trunk eventually becomes so sore that the elephant curls it up and seldom afterwards uses it for offensive purposes.

After some days of this treatment the captive is taken to bathe, still attached to his two tame companions. The mahouts of the tame elephants control him with the traditional goad known as a *hawkus*, *ankus*, or *hendoo*, which was depicted on ancient Numidian coins and is still used today in identical forms. By means of this they persuade the elephant to lie down in the water, which he does reluctantly at first, but afterwards



Traditional elephant goad, or *hawkus*

with increasing pleasure, for all elephants are very fond of bathing. Eventually these bathing times become for the elephant the high-spot of the day's routine, and are looked forward to with anticipatory pleasure. After some three or four weeks the captive can be taken alone to the water with his legs hobbled without the aid of the tame elephants. The trainer simply goes backwards in front of him with the *hawkus* pointed at the elephant's head, while two assistants with crooks walk at each ear.

The first mounting of the elephant requires considerable courage on the part of the mahout. He slips across from the back of one of the tame elephants and seats himself on the animal's neck. A man with a *hawkus* threatens the elephant from the front, and by this time such is the animal's respect for this implement that he will seldom attempt to remove the mahout forcibly with his trunk. The mahout remains in position for a longer time each day, and after about two months the assistance of the tame elephants can be dispensed with altogether.

A good mahout will soon strike up a relationship with his animal based on mutual respect. By patient care he will teach the

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elephant to be guided by the slightest pressures applied by his toes behind the ear, and to perform a variety of actions at the word of command. The *hawkus* is now seldom required, and a mere touch with its point will serve to remind the animal of the penalties of disobedience.

A good trained elephant will respond to at least thirty different words of command. Examples are *sum beit* (kneel), *joor* (put your feet close together), and *doom rakh* (keep your tail still). The majority of the words of command are monosyllabic for easy recognition, and many are in universal use in the East, even in regions where the mahouts would normally speak different languages.

Each mahout is normally allowed to choose his elephant's name, and these are often delightfully humorous, and even poetical. Williams tells in *Elephant Bill* how a calf who resisted the attack of a tiger, and thereby become the camp hero, was christened Kya M'Nime, meaning "the tiger could not overcome him". Another elephant with an amply proportioned stern was called Ma Pin Wa, or "Miss Fat Bottom". But the mahouts do not normally call their mounts by name, for they do not respond to them as a dog would do. They are christened so that the men can talk about them among themselves.[66]

The trained elephant can be put to many different uses, each of which has its own specialized equipment. As a pack animal it is usually provided with a large quilted pad filled with cotton with a groove down the centre to avoid pressure on the backbone. For hunting, the howdah is the most satisfactory device. This is a large box-like structure divided into two compartments, the front being for the hunter, the rear for his gun-bearer. Its sides, which are made of light wood reinforced with metal at the corners, reach about waist high. The hunter sits on a bench, and can command a view in all directions. But apart from its use in hunting, the howdah is unpopular, for its occupant must suffer a disagreeable swaying motion. For ordinary travel a *char-jarma* is usually preferred. This is an oblong frame lashed upon the pad already described and secured by girths. Along the centre is a padded backrest so that two people can sit comfortably on either side. The *char-jarma* is widely used in the East, and is familiar, in a rather elaborate

form, to any child who has had an elephant ride at the London Zoo.

Passengers travelling by elephant can mount the animal in various ways. In the East a ladder, which is the easy and obvious method of approach, would be considered *infra dig*, and a more hazardous procedure must be adopted. If the mahout instructs the elephant to kneel down things are not too bad; the passenger steps on one of the front legs, grasps the ear, and hoists himself up by the rope collar round the animal's neck. But mahouts are reluctant to make their charges kneel too often, as the operation causes considerable strain to such bulky creatures. Instead, they instruct the elephant to form two steps for the passenger, one with the raised fore-leg, the second with the crooked trunk. This method can cause complete demoralization among the stout or elderly. Alternatives are the combined use of a raised hind leg and a good heave on the tail, or even being whisked into the air by the trunk to be deposited on the elephant's head. In general it is not suprising that most people nowadays find it safer, as well as quicker, to travel by rail.

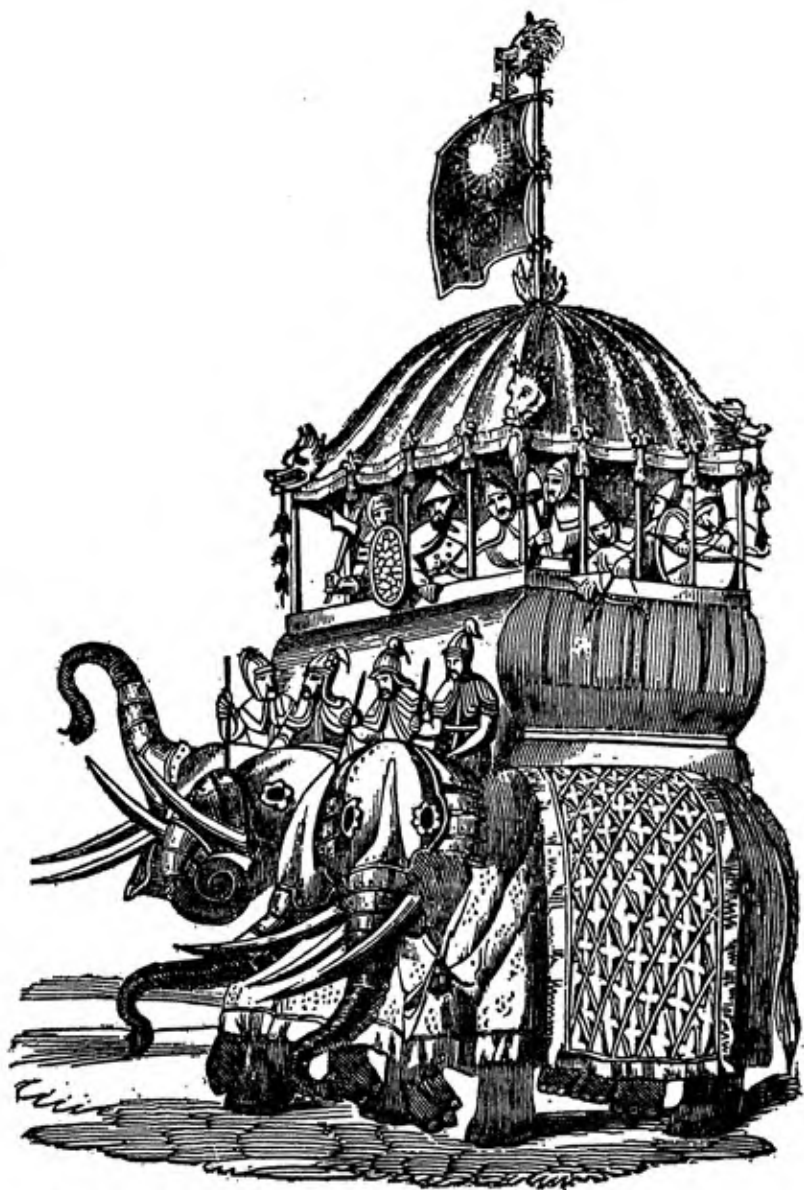
In spite of its size the elephant is not a great success as a beast of burden, and cannot deal with a load of much more than 600 lbs. This is little more than the amount that can be carried by a team of eight men. It follows that since the development of more modern forms of transport in the East the elephant has become an uneconomical proposition for the transportation of goods. Nevertheless it remains a magnificent haulier. A single elephant will make light work of pulling a log of two tons or more in weight, and a pair used to working in harness can pull five tons. Smaller logs are lifted nonchalantly on the tusks, the trunk holding them in position, to be deposited with the greatest precision wherever the mahout directs. Elephants are also extremely useful for tree felling. They will first press against the tree with the forehead or the underside of the trunk until it is at the required angle, and then complete the work with the fore-foot. If there are any obstinate roots holding the tree on the opposite side the animal will walk round and tear them up. This last operation will often be carried out without instruction, showing that at least in this direction the elephant possesses considerable powers of rational thought.

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Apart from its obvious uses as a beast of burden, a haulier, and a mount for the hunter, the elephant in the past has served man in some rather unusual ways. For example, several instances are known of its use as a state executioner. The training of the executioner elephants was somewhat macabre, it being usual to make them go through several preliminary rehearsals with an imaginary victim. The order would first be given "to slay the wretch", whereupon the elephant would twist its trunk round the supposed body of the criminal, lay it on the ground, and then slowly bring down its fore-feet on the spots where the limbs might be supposed to lie. When this had gone on for some minutes the elephant would stand quite still, its trunk raised high above its head. Being then asked to complete its task the animal would bring down one fore-foot on its imaginary victim's abdomen and the other on his head, thereby crushing out the last vestige of life. Another practice was to use a pair of elephants to bend two adjacent trees towards one another; the victim was then roped to the trees by an arm and a leg on each side. At a given signal the elephants would release the trees and the criminal was ripped asunder.[67]

One of the most important uses of the elephant has been in human warfare. It was first employed for this purpose in Asia, and in ancient times the strength of an eastern potentate was largely measured by the number of war elephants he could put in the field. The animals were heavily armoured with metal plates on their heads and sides; swords were tied to their trunks and poisoned daggers to their tusks. Their riders were protected by armour or chain mail and fought with swords and javelins like knights at a medieval tournament. The elephant was the forerunner of the modern armoured tank, and, like the tank, it had a psychological as well as physical effect on the enemy. It did not become obsolete until the introduction of firearms gradually made it more of a liability than an asset. This was not because the elephant was especially vulnerable to firearms, but because it was reduced to a panic by the noise of their explosion; it would then be as likely to stampede through its own lines as to charge the opposing army.

But before this time arrived many writers testified to the use of the elephant in war and its ability to instil fear into the



Kublai Khan in his wooden castle, borne on the backs of four elephants.
After Ranking (1826)

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hearts of the enemy. The Emperor Baber, founder of the Mogul dynasty, tells in his *Memoirs* how a single elephant was sufficient to enable Sultan Ibrahim's troops to rout the far larger forces of Alim Khan,[68] and the historian Gibbon records how Tamerlane wrote to one of his enemies: "Thou art no more than a pismire; why wilt thou seek to provoke the elephants? Alas they will trample thee under their feet." [69] According to Marco Polo, Kublai Khan in his campaign against his rebellious kinsman Nayan,

took his station in a large wooden castle, borne on the backs of four elephants, whose bodies were protected with coverings of thick leather hardened by fire, over which were housings of cloth of gold. The castle contained many cross-bow-men and archers, and on the top of it was hoisted the imperial standard, adorned with representations of the sun and moon.[70]

Other interesting passages occur in Mahummud Casim Ferishta's *History of Hindostan*, published in 1768. One tells of the terrible effect of the Emper Akbar's war elephants on the garrison of the fort of Chitor:

Akbar perceiving that he must lose a great number of his troops in case of a close attack, ordered a distant fire to be kept up upon the desperate Rajaputs, till he had introduced three hundred elephants of war, which he immediately ordered to advance to tread them to death. The scene became now too shocking to be described. Brave men rendered more valiant by despair, crouded around the elephants, seized them even by the tusks, and inflicted upon them unavailing wounds. The terrible animals trode the Rajaputs like grasshoppers under their feet, or winding them in their powerful trunks, tossed them aloft into the air, or dashed them against the walls and pavements. Of the garrison, which consisted of eight thousand Rajaputs and of forty thousand inhabitants, thirty thousand were slain, and most of the rest taken prisoners.[71]

The use of the elephant in war first spread to the West as a result of the conquests of Alexander the Great, who encountered the war elephants of Darius before he crossed the Indus. The Greek Historian Arrian has left in his biography of Alexander a graphic account of his hero's meeting with the army of the Indian King Porus, in which elephants were widely used. Porus decided

to make a last-ditch stand against the advancing Macedonians, and drew up his forces in order of battle on a plain where he would have full room to manœuvre his chariots: Arrian continues:

First, he placed the elephants in the front, at the distance of one hundred foot from each other, to cover the whole body of foot, and at the same time to strike a terror into Alexander's horse; for he imagined that none, either horse or foot, would be so hardy as to endeavour to penetrate through the spaces between the elephants. The horsemen, he thought, could not, because their horses would be terrified at the sight, and the foot would not dare, because the armed soldiers would be ready to gall them on each hand, and the elephants to trample them under their feet. The foot possessed the next rank; they were not indeed placed in the same order with the elephants, but so small a way behind, that they seemed to fill up the interspaces. At the extremities of each wing he placed elephants bearing huge wooden towers, wherein were armed men. . . .[72]

Porus, who was a man of gigantic stature, was seated on the largest elephant of all, and the splendid appearance of the King and his tremendous army in battle array so impressed Alexander that he is reputed to have said, "At last I have met with a danger suitable to the greatness of my soul." [73]

With the caution of a skilful general Alexander refrained from a direct attack on the main body of the elephants. Instead he relied on his swift-moving cavalry and the demoralizing effect of the clouds of arrows poured into the enemy by his Thracian archers. These tactics soon spread panic among the enemy foot soldiers, but the elephants stood firm and, when an advance was at last attempted trampled the Macedonian soldiers beneath their feet. "The most dismal thing of all," wrote Quintus Curtius, "was when these animals took up the armed soldiers with their trunks and delivered them up to their governors on their backs." [74]

But eventually Alexander began to gain the advantage, and his soldiers made a concentrated onslaught on the elephants themselves. They chopped at their legs with axes, probably with the object of hamstringing them, and cut off their trunks with a curved weapon like a scythe. The elephants now began

to exhibit that fatal panic to which it can never be certain they will not fall victim. In Arrian's words:

The beasts now being pent up in a narrow space, and violently enraged, did no less mischief to their own men than the enemy; and as they tossed and moved about, multitudes were trampled to death; besides, the horse being confined among the elephants, a huge slaughter ensued, for many of the governours of the beasts being slain by the archers, and the elephants themselves, partly enraged with their wounds, and partly for want of riders, no longer kept any certain station in the battle, but running forwards, as if madness had seized them, they pushed down, slew, and trampled under foot, friends and foes without distinction. Only the Macedonians having the advantage of a more free and open space, gave way, and made room for the furious beasts to rush through their ranks, but slew them whenever they attempted to return. But the beasts at last, quite wearied out with wounds and toil, were no longer able to push with their usual force, but only make a hideous noise, and moving their fore feet heavily, passed out of the battle.[75]

The fighting ended with complete victory for Alexander. Porus was so exhausted by his wounds (he had sustained nine during the course of the battle) that he slid down in a faint from the back of his elephant. Deeply impressed by his courage and generalship, Alexander allowed him to retain his independent kingdom, and even increased his domains by the addition of new territory. The medal depicted on page 222 which shows Alexander wearing the head-skin of an elephant, is believed by some authorities to have been struck to commemorate this famous victory.

After the death of Alexander in 323 B.C. his empire was divided among his generals, and all obtained a share of the elephants captured in his eastern campaigns. Soon a more or less permanent war developed between the Seleucid dynasty, which became established in Asia, and the Ptolemaic dynasty in Egypt, and the elephants were used to great effect by both sides. But as Ptolemy's elephants gradually died off, it became apparent that replacements could not be obtained from Asia, as this would be prevented by Seleucus. A new source of supply had therefore to be found. Under the second Ptolemy, named

Philadelphus, expeditions were sent southwards into Africa, and large herds of elephants were located along the banks of the Baraka river on the Red Sea coast. In 280 B.C. a settlement was founded there for the purpose of capturing elephants for the Ptolemaic armies. It was called Ptolemais Theron (or Ptolemais of the Hunts) and a contemporary inscription records that "elephants were caught in great numbers for the King, they were brought in ships to the King".

These elephants from Ptolemais Theron were the first African elephants to be harnessed to human use. At first they were shipped all the way to Egypt by sea in specially constructed sailing boats, being taken up the canal which ran from the head of the Gulf of Suez to Memphis. Later they were disembarked at Berenice, a Red Sea port about 500 miles south of Suez, and marched across the desert to the Nile valley along a road newly built for the purpose. They were trained in Egypt, but the method of training, like that of capture, is unknown. It seems likely, however, that it was carried out by the mahouts who had accompanied the original Asiatic elephants from the East and was therefore based on traditional Indian techniques.

The African elephants were first used in the field against the Seleucids during the Third Syrian War at the beginning of the reign of Ptolemy III. But it does not seem that they were tested very seriously in action, for Ptolemy secured an easy victory. He captured at this time a large number of trained Asiatic elephants which he brought back to Egypt with their mahouts. The next encounter between African and Asiatic elephants occurred in 217 B.C. when battle was joined between Ptolemy IV and Antiochus the Great of Syria at Raphia, near Gaza. The Asiatic elephants proved their superiority in every way. The Greek historian Polybius, in his account of the battle, stresses their great superiority in size and strength, and that they were far less nervous than their adversaries.* Nevertheless Ptolemy won the victory, which he celebrated with the

* The distinction in size may at first strike us as surprising, for the typical African elephant (*Loxodonta africana*) is of course somewhat larger than his Asiatic cousin. The explanation is that Ptolemy's African elephants almost certainly belonged to the forest subspecies (*Loxodonta africana cyclotis*), whose range then extended along the southern fringes of the Sahara across the whole African continent.

triumphal progress described in the Third Book of Macca-bees.

Meanwhile in North Africa and Europe both African and Asiatic elephants were becoming better known. The range of the forest elephant extended at this time as far north as Morocco, Algeria, and Tunisia, its presence on the Atlantic coast having been reported by the Carthaginian navigator Hanno as early as 500 B.C. According to Sir William Gowers the Carthaginians first began the capture and training of these animals about 277 B.C.[76] They were widely used by Hannibal in all stages of his campaign against Rome, and their demoralizing effect on the enemy contributed in no small way to his initial success.

The most disastrous encounter between the Romans and the Carthaginian elephants occurred at Tunis in 255 B.C. The Roman commander, Regulus, was inexperienced in dealing with war elephants, and his troops were drawn up in close order. The opposing general, Xantippus, ordered a charge and the elephants bore down on the Roman centre. Compressed into too small an area, the Romans were not able to avoid their savage assault, and supporting attacks on the flanks by the superior Carthaginian cavalry caused the annihilation of Regulus's forces.

The classic example of the use of the elephant in antiquity is the famous crossing of the Alps by Hannibal in 219 B.C. He travelled by way of Spain, France and Switzerland, his object being to destroy the Roman armies in France and northern Italy before marching on Rome. He was accompanied by an army of fifteen thousand foot soldiers and thirty-seven elephants. The march through Spain and the crossing of the Pyrenees were themselves considerable achievements, and it says much for Hannibal's brilliant generalship that he arrived on the western bank of the Rhone with all his forces intact. His problem was now to get the elephants across this formidable obstacle. The story is told by Polybius and, owing to its great interest, I shall quote it in full:

The passage of the elephants was performed in the following manner. When they had made a sufficient number of floats, they joined two together, and fastened them strongly to the ground upon the bank of the river. The breadth of both together was

about fifty feet. To the extremity of these they fixed two more, which were extended over into the water: and to prevent the whole from being loosened and carried down the river by the rapidity of the current, they secured the side, that was turned against the stream, by strong cables fastened to the trees along the bank. Having, in this manner, finished a kind of bridge, which was extended to the length of about two hundred feet, they then added to it two other floats of a much larger size, which were very firmly joined together, but were fastened in so slight a manner to the rest, that they might at any time be separated from them with little difficulty. A great number of ropes were fixed to these last floats; by the help of which, the boats, that were designed to tow them over, might hold them firm against the violence of the stream, and carry them in safety with the elephants to the other side. They then spread a quantity of earth over all the floats, that their colour and appearance might, as nearly as was possible, resemble the ground on shore. The elephants were usually very tractable upon land, and easy to be governed by their conductors, but were at all times under the greatest apprehensions whenever they approached the water. Upon this occasion, therefore, they took two female elephants, and led them first along the floats. The rest readily followed. But no sooner were they arrived upon the farthest floats, than, the ropes being cut which bound them to the rest, they were immediately towed away by the boats towards the other side. The elephants were seized with extreme dread, and moved from side to side in great fury and disorder. But when they saw that they were every way surrounded by the water, their very fears at last constrained them to remain quiet in their place. In this manner, two other floats being from time to time prepared and fitted to the rest, the greater part of the elephants were carried safely over. There were some indeed, that were so much disordered by their fears, that they threw themselves into the river in the midst of their passage. This accident was fatal to their conductors, who perished in the stream. But the beasts themselves, exerting all their strength, and raising their large trunks above the surface of the river, were by that means enabled not only to breathe freely, but to discharge the waters also, as fast as they received them: and having by long struggling surmounted likewise the rapidity of the stream, they at last all gained the opposite bank in safety.[77]

There now remained the even more fearful barrier of the Alps themselves. To take fifteen thousand men and thirty-seven

elephants over these wild passes, entirely unmapped and without a road or track of any kind, was a daunting enough task even for a Hannibal. He managed it, but at a cost. When he arrived in Italy he left behind the bodies of many men and animals who had died from exposure, or fallen into the terrible chasms that lined his route. The remaining elephants were in poor shape, but nevertheless, according to Livy, Appian, and other Roman historians, they were a decisive factor in winning the battle of Trebia for Hannibal. The Roman horses were appalled by the sight and smell of these strange animals, and the Gauls, who were allied with the Romans, could not resist the fierceness of their attacks. But Hannibal was soon to lose his powerful allies. In crossing the Apennines after this battle seven elephants starved to death, and others doubtless died from their injuries or fatigue. When the general came to cross the Arno the only survivor of the original thirty-seven was the elephant on which he himself rode.

This story shows how near the elephant came to changing history, but we know of course that Hannibal did not take Rome, and that Carthage eventually fell to the invading forces of Scipio Africanus. As soon as invasion threatened, Hannibal returned quickly to Africa to defend his capital. A great drive for elephants was begun in the neighbouring forests and, when the two great generals met at Zana in 202 B.C., Hannibal was able to deploy eighty war elephants in the front line of his army. But Scipio was not unmindful of the disaster that had befallen Regulus at Tunis some fifty years before. He instructed his troops to extend their order so that they could step aside and leave lanes for the charging elephants to run along. In this way the animals could be attacked effectively from the side and rear. He also told his cavalry to dismount, so that the horses should not be asked to face so unfamiliar an enemy early in the battle. His archers were ordered to concentrate all their fire on the elephants so as to turn them into their own lines. The result was completely successful. The elephants were thrown into confusion and in their hurried retreat broke the right wing of Hannibal's army. The beaten general fled to Hadrumentum. This battle ended the Second Punic War, and by the terms of the treaty the Carthaginians not only agreed to hand over all

their war elephants to the conqueror, but never to capture or train the animals again for military purposes.

During the wars with Carthage, instruction in the techniques for dealing with enemy elephants formed part of the military training of the Roman army. The soldiers were taught to attack the trunks of the animals, thereby causing them great pain and destroying their spirit for the fight. Horses protected with armour would gallop past the elephants drawing light chariots in which sat specially trained men who would jab at them with lances. Other troops wore armour so thickly covered with spikes that the elephant could not seize them with its trunk; they could thus make a close approach and thrust their spears into its vitals. The rider of the elephant was also singled out for concentrated attack. He was particularly vulnerable to the archers, and was sometimes assaulted by slingers with stones fastened by cords to long poles.

Although the Romans regarded the elephant as an enemy worthy of respect, they never used it widely in their own armies. Perhaps it was too exotic an ally for the dour legionaries, or the Roman generals may well have come to the conclusion that it was liable to be more trouble than it was worth. Nevertheless, shortly after the power of Carthage was broken, a number of elephants were used in the campaign of Titus Quintius Flaminius against the King of Macedon, who could not resist this unfamiliar power. Thirty years later, in the Second Macedonian War, they were again used with conspicuous success by Q. Martius Philippus. The enemy horses were terrified by the animals, and Perseus of Macedon attempted—although without success—to retaliate with huge wooden models containing a man who simulated the trumpeting of a charging elephant.

Julius Cæsar occasionally used elephants in his armies, either to boost the morale of his own troops when it was likely that the enemy would also employ the animals, or to subjugate peoples who were not familiar with this method of warfare. But for his commando technique of rapid marches and surprise sorties against an unsuspecting foe the animals proved to be more of a hindrance than a help, and he often chose to abandon them in the rear. Most of the elephants used by Cæsar and other Roman generals were probably of the African species, which were more

readily procurable. But the Asiatic elephant was also well known to the Romans. Captured specimens from the East were doubtless used in war, and the Asiatic species is depicted on numerous coins and medals and in works of art: for instance the famous sculpted specimen at Leptis Magna in Tripolitania.

After Cæsar's time the war elephant became obsolete in Europe and Africa. The use of the animals was restricted to triumphs and ceremonies, and to the gladiatorial exhibitions of the Roman arena. These matters will be dealt with in the next chapter, but before we leave the subject of elephants as servants of man a word must be said about another aspect of the subject which has not yet been touched upon. I refer to recent experiments made in the Belgian Congo to train the African elephant for domestic use.

The foregoing historical account proves that the teachability of the African elephant was well known to the ancients; but with the decline of Imperial Rome this knowledge was lost. Moreover, when man rediscovered the uses of the elephant it was not through contact with the African species in the still unexplored Dark Continent, but through the discoveries made by early travellers in the East. Not unnaturally, therefore, it was the Asiatic animal that acquired a reputation for responsiveness to human control, while the African still languished in obscurity. When, after many more centuries, the latter reappeared upon the scene, it was regarded as a morose and untameable creature, valuable as a source of ivory, but otherwise greatly inferior to its Asiatic relation.

Now it is true, as I have said earlier, that the Asiatic elephant is the more docile, and perhaps slightly the more intelligent of the two; but the statement which has appeared in so many books during the past century that the African elephant is virtually untameable is not supported by the facts. The story which was to disprove the generally accepted view began in the seventies of the last century. At that time King Leopold II of the Belgians, when still Duke of Brabant, paid a visit to Ceylon, where he was greatly impressed by the use of trained Asiatic elephants. His observations suggested to him that these animals, if imported into the Belgian Congo, might prove of great value to the country as beasts of burden and for local transport. It

never occurred to him at the time to question the general opinion that the African elephant was untameable, and he accordingly instructed that four Asiatic elephants should be shipped at his own expense from Bombay to East Africa. The experiment was not a success. Only two survived the voyage, and both of these died before reaching the Congo. After this discouraging start it was decided for the time being to abandon the venture.

But some twenty years later Leopold, who was now King, decided to make a similar but even more ambitious experiment. Why not attempt to revive the ancient Carthaginian art of training the African elephant itself? He instructed an officer, one Commandant Laplume, who had wide experience of the Congo, to found an elephant-catching station in the colony. In 1899, Laplume set up his headquarters at Kira Vunga in the Bas-Uélé district, at the meeting point of the Uélé and Boma Kandi rivers. This lay in the heart of a region occupied by large numbers of the typical Congo forest elephants, who throughout have been the main subjects of the experiment. For some time Laplume's attempts at capturing the animals were disappointing. Pitfalls, which were tried first, inflicted excessive harm on the captives, and the *keddah* system that worked so well in the East proved impractical here on grounds of expense. Laplume was forced to cast around for other methods. At first he tried surrounding a herd with a team of men, who, at a given signal, would make a great din and cause the herd to stampede; the theory was that the herd would abandon their calves in terror, leaving these to be rushed upon by the waiting hunters. Unfortunately this method reckoned without the courage of the cow elephants, who often refused to abandon their young, or came charging back to the rescue as soon as they had recovered from their first fright. Any hunter who then stayed to argue was in danger of being impaled on the enraged mother's tusk.

In spite of its dangers this system led to the capture and successful training of some thirty-five elephants during the first ten years of the station's operation. Then, with trained animals available, a new method was gradually evolved. The elephant hunters began operations at the beginning of the dry season in early February, and catching went on till the end of May. Each

hunting party consisted of about twenty armed men, twenty porters and a dozen trained elephants with their mahouts. The porters were equipped with ropes of sufficient strength to hold an elephant by the leg, but soft in texture so as not to bite into the hide and cause wounds. The whole party advanced in crescent formation, the ropers at the outer ends, until the herd was partially enclosed. The leader would then blow a whistle, at which signal men with guns would fire a fusillade into the air. At the same time the ropers would dash upon the selected calves and slip the ropes round their legs; as soon as they were in place other men would take a turn of the loose end round the nearest tree. Meanwhile the hunters, accompanied by the tame elephants, would form a line between the roped calves and the retreating herd. Should an angry mother return to rescue her offspring the tame elephants would head her off into the jungle. Only very occasionally would an exceptionally persistent cow have to be shot.

In 1925 Laplume's original station was transferred to Api, and five years later a second station was opened at Gangala na Bodio. Training at both stations followed the same pattern, the Belgians being most insistent that kindness was the key to success. In no circumstances was it permitted for an elephant to be struck, and anyone who transgressed this rule was severely punished. Sometimes the elephant itself inflicted the punishment, for no animal is quicker to resent anything that could be regarded as an injustice. In fact, when my friend Captain Keith Caldwell visited Api in 1925 he was shown the graves of six mahouts who had paid the penalty for taking liberties with their charges. At the same time he reported that there had never been a case of an elephant having to be destroyed for viciousness or even habitual bad temper.

Today only the station at Gangala na Bodio remains, and even there training is carried out on a very much smaller scale than previously. Leopold's dreams have not come true, for the rapid development of mechanical transport has rendered the elephant obsolete for the purpose he originally foresaw. Also the economics of the Belgian method could never have been very satisfactory. Only immature elephants were captured, and a period of ten or twelve years had therefore to elapse before the

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trainee was ready for heavy work. Older elephants caught occasionally in the past proved virtually impossible to train. Nevertheless the experiment, so far as it went, was a bold and fairly successful one, and elephants are still being trained at Gangala na Bodio for shipment to the world's zoos and circuses. Moreover, the Belgians have finally given the lie to the old superstition that the African elephant cannot be tamed. Although temperamentally less stolid and reliable than its Asiatic cousin, it has yet proved its ability to act, today as in Hannibal's time, as a faithful servant of man.

CHAPTER THIRTEEN

Elephants for Show and Entertainment

THE HUMAN SPIRIT lives by wonder, and few aspects of the natural world have been more provocative of this emotion than the elephant. By reason of its size, strength and unusual appearance, it has been a source of profound astonishment and curiosity to man ever since he evolved the power of reflective thought. Quite apart from its practical use, therefore, it has always been an animal in much demand for purposes of show and entertainment.

Our consideration of the elephant in this context can be conveniently made under four main heads: first, its place in the menageries and circuses of antiquity, and particularly the part it played in the Roman arena; second, its use in pageantry and ceremonial, both in the ancient world and in more recent times in the East; third, its role as a combat animal in the entertainments devised by Asiatic princes; fourth, its growing importance as an exhibit in western zoos and circuses since its reintroduction into Europe during the sixteenth century.

The interest of the elephant as a spectacle was recognized almost as early as its practical use. Already in the ninth century B.C. Assurnasirpal II had established a zoological garden containing a number of elephants which he had caught in Syria; others lived in a zoo at Kalhu in Phœnicia during the same period. Alexander the Great brought Asiatic elephants to ancient Greece after his eastern campaigns, and several of these remained the pride of the Macedonian court for many years. At Carthage the elephants of war, when not actively engaged in campaigns, were kept in a public park in the bounds of the city where they were well known to the populace as a curious spectacle.

But it was the Romans who first fully exploited the elephant's appeal to the human imagination. Always sceptical of its value in war, they nevertheless regarded it as an indispensable performer in the circuses which, we are told, ranked second only in importance to the provision of bread in maintaining public happiness and discipline. In fact the demand for the immolation of elephants in the bloody ritual of the amphitheatre played no small part in the extinction of the animals in Rome's North African dominions.

According to Pliny the earliest use of elephants in the amphitheatre was "in the consulship of M. Antoninus and A. Postumius in the year of the City 655." They were first set to fight each other, but later, it seems, were matched against bulls. Eventually even this appeared to be too tame a pastime to while away the Roman afternoon, and in the time of Pompey the elephants were opposed by armed men. Pliny writes:

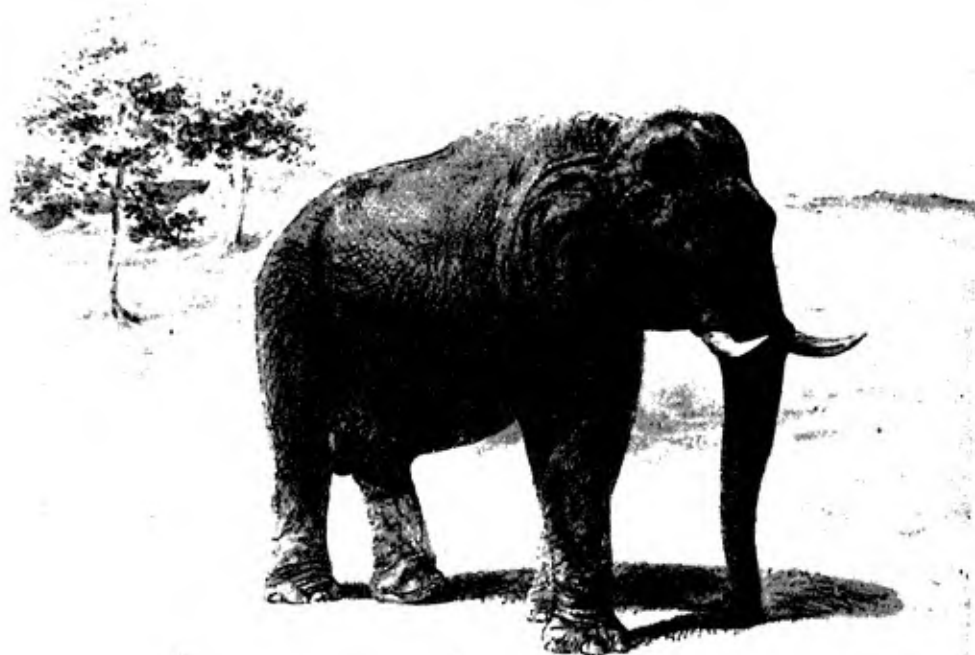
In the second consulship of Pompeius, at the dedication of the temple of Venus Victrix, twenty elephants, or, as some say, seventeen, fought in the Circus against a number of Gætulians, who attacked them with javelins. One of these animals fought in a most astonishing manner; being pierced through the feet, it dragged itself on its knees towards the troop, and seizing their bucklers, tossed them aloft into the air: and as they came to the ground they greatly amused the spectators, for they whirled round and round in the air, just as if they had been thrown up with a certain degree of skill, and not by the frantic fury of a wild beast. Another very wonderful circumstance happened; an elephant was killed by a single blow. The weapon pierced the animal below the eye, and entered the vital part of the head. The elephants attempted, too, by their united efforts, to break down the enclosure, not without great confusion among the people who surrounded the iron gratings. It was in consequence of this circumstance, that Cæsar, the Dictator, when he was afterwards about to exhibit a similar spectacle, had the arena surrounded with trenches of water, which were lately filled up by the Emperor Nero, when he added the seats for the equestrian order. When, however, the elephants in the exhibition given by Pompeius had lost all hopes of escaping, they implored the compassion of the multitude by attitudes which surpass all description, and with a kind of lamentation bewailing their unhappy fate. So greatly



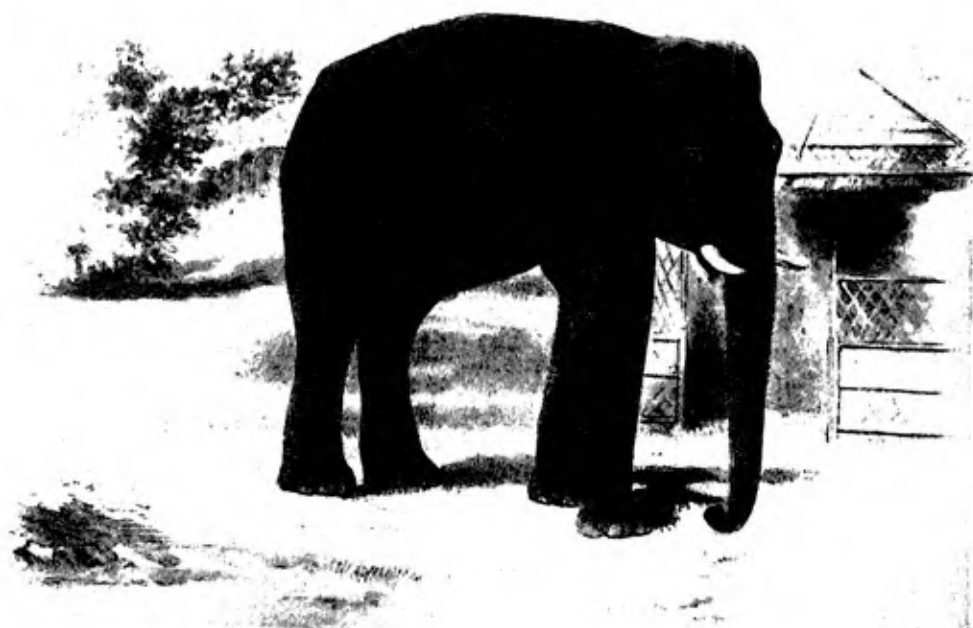
15 a) Marshal Zhukov riding an elephant at New Delhi

b) Ceremonial elephants at Mysore





16 a & b) A *Koomeriah* (above) and a *Meerga*. From Sanderson (1878)



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were the people affected by the scene, that forgetting the general altogether, and the munificence which had been at such pains to do them honour, the whole assembly rose up in tears, and showered curses on Pompeius, of which he soon afterwards became the victim.[78]

This unaccustomed sentimentality on the part of the audience did not persist in later generations, for the massacre of elephants continued unabated for many centuries. Under Julius Cæsar they were often matched against horse and foot soldiers, twenty elephants being opposed to five hundred men. An elaboration of the contest was to provide each elephant with a tower and sixty defenders, and match twenty of these against five hundred horse and five hundred foot soldiers. Later, under Claudius and Nero, the final item in the circus was always a contest between a single gladiator and an elephant.

The idea of matching an elephant with a man in single combat originated in Carthaginian times. Pliny tells how on one occasion Hannibal forced his Roman prisoners to fight one another until all but one was slain. The survivor was pitted against an elephant, with a promise from the Carthaginian commander that, should he be the victor, he would be given unconditional liberty. Battle was joined, and "to the great regret of the Carthaginians", the Roman was the victor. Pliny then tells how Hannibal instructed some soldiers to assassinate him on the way home in case he should explode the legend that the elephant was an invincible antagonist.[79]

It was, of course, unnecessary for elephants destined for the arena to receive any form of training; in fact the wilder and more intractable they were the better. But the Romans also selected certain animals to train for shows and triumphs, or to maintain for breeding purposes in the capital. Great care was lavished on these animals, so that they became as docile and friendly as the elephants of the arena were ferocious and violent. Kindness and patience were alone employed, and the elephants were gradually accustomed to unusual sights and sounds so that they might play a part in public ceremonials without taking fright. Particular attention was paid to the effect of music upon them. Not only were they taught to lose their fear of cymbals and other noisy instruments, but to react with suitable

appreciation to more seductive harmonies. Thus they would listen, enraptured to the sound of flutes and tap out the rhythm with their feet.* The presence of great numbers of people would not disturb these elephants in the slightest, and the Romans delighted to exhibit their docility to the multitude. Thus the Roman rhetorician *Ælian* describes how on one occasion twelve of the best trained were taken to a theatre, where they gave a perfect display of figure marching, sometimes walking round in a circle and sometimes dividing themselves into different groups, scattering flowers on either side as they went. At the end of the performance, still completely unruffled, they were feasted by the Romans with regal magnificence. Enormous couches were placed in the arena, covered with rich tapestries and decorated with paintings. Beside the couches a banquet was spread on tables of ivory and cedar, vessels of gold and silver only being employed. The twelve elephants then marched in, six clad as men and six as women. With nonchalant ease they draped themselves upon the couches, and, when all were ready, stretched out their trunks and ate the good things provided for them with praiseworthy grace and decorum.[80] By comparison with this occasion the Chimpanzees' Tea Party at the London Zoo can be regarded as nothing more than a vulgar bun fight, for not a trace of borborygmus (let alone an indiscreet elephantine belch) seems to have marred the exquisite gentility of the feast.

Pliny adds further examples of the unusual accomplishments of the Roman elephants. They were taught to throw arrows with such force that the wind would not deflect them from their course, and to burlesque the actions of the gladiators. At a show

* The effect of music on the elephant has been the subject of several other unusual observations. For example, the eminent British surgeon Sir Everard Home (quoted by C. F. Holder, *The Ivory King*, 1886, p. 17) described a particularly charming experiment which he carried out in the early years of the nineteenth century. He says: "I got Mr. Broadwood, as a matter of curiosity, to send one of his tuners with a piano-forte to the menageries of wild beasts in Exeter Exchange, that I might know the effect of acute and grave sounds upon the ears of a full-grown elephant. The acute sounds seemed hardly to attract his notice; but as soon as the grave notes were struck, he became all attention, brought forward the large external ear, tried to discover where the sounds came from, remained in the attitude of listening, and after some time made noises by no means of dissatisfaction."

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put on by the Roman general Germanicus they performed a sort of jig, although with somewhat uncouth and irregular movements; and it was apparently no unusual thing to see them "frolic through the steps of the Pyrrhic dance". Pliny's assertion that they were trained to walk the tight-rope might be doubted had it not been confirmed by other classical authors such as Seneca and Dion; it is also borne out by the astonishing feats of balance that elephants have been persuaded to achieve in modern circuses. A less exacting, but equally eccentric, spectacle exhibited by one Roman impresario was a procession of four elephants carrying a litter on which lay a fifth representing a woman in childbed.[81]

Most modern readers will find the idea of such exhibitions distasteful, for the elephant is too dignified to be turned into a vulgar buffoon. But the Romans also used the animal for more legitimate purposes, especially in the poms and triumphs that followed successful battles, or as part of the pageantry connected with the enthronement of a new emperor. To such occasions the great size and majestic mien of the animals lent an entirely appropriate dignity, and they must have looked as effective in a procession through ancient Rome as did the Asiatic elephants which have played a more recent part in the state pageants of Oriental princes. Apart from special events, it was customary to vote the Roman emperors a permanent ceremonial chariot drawn by four elephants, and these are often depicted on coins and medals. For example, a medal struck after the death of Augustus shows his statue being drawn in an elephant chariot to the games; another, the tyrannical Caligula seated as a god surrounded by stars.

In the West, one of the factors contributing to the elephant's popularity for purposes of show and entertainment was always its rarity. To have brought back such a formidable and unusual creature from distant lands was a hall-mark of energy and power which added greatly to the prestige of the person responsible. But that rarity was not the sole reason for its appeal is proved by the popularity it has always enjoyed for the same purposes in its Asiatic homeland. Far from breeding contempt, familiarity has created a universal veneration for the elephant in every eastern country which it inhabits. The same would

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probably also have been true of Africa if the peoples of that continent had been sufficiently advanced in the techniques of civilization to harness the elephant to their own use.

The splendours of Asiatic pageantry are now somewhat reduced owing to the decline in affluence of the local princes. Moreover, such wealthy Orientals as survive have lately shown a distressing readiness to forsake the elephant for the less



Statue of the deified Augustus in triumph in an elephant chariot.
From a Roman medal

romantic attractions of a chromium-plated Cadillac. But in the early years of the British raj in India the ceremonial elephant was one of the most impressive features of any state occasion. For example, here is an extract from an eyewitness account of the wedding of Vizier Ally, a high Indian official, in 1795:

The procession was grand beyond conception; it consisted of about twelve hundred elephants, richly caparisoned, drawn up in a regular line, like a regiment of soldiers. About one hundred elephants in the centre had howdahs, or castles covered with silver: in the midst of these appeared the nabob, mounted on an uncommonly large elephant, within a howdah covered with gold, richly set with precious stones.[82]

The draperies worn by the elephants on such occasions were

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of the richest silks, and sometimes the skins of the animals were tattooed and painted to add to the splendour of the effect. But, sadly, the full pomp and pageantry of an elephant procession is rapidly becoming a thing of the past. On a recent visit by Marshal Zhukov to New Delhi only a single elephant was produced, which the distinguished visitor rode with the self-conscious embarrassment of a daring middle-aged parent at the Zoo.

Not all the former princes of the East could afford such a lavish display as that described above, and sometimes, I regret to say, stratagems were employed to augment the impression of magnificence. One of these was described by the English traveller John Bell when he visited Peking in 1720:

After dinner, we were conducted to the Emperor's stables, where the elephants are kept . . . and saw these huge animals richly caparisoned in gold and silver stuffs. Each had a rider on his back, who held in their hands small battle-axes, with a sharp pike at one end, to drive and guide them. We stood about an hour admiring those sagacious animals; some of them were very large, who, passing before us at equal distances, returned again behind the stables; and so on round and round, till there seemed to be no end of the procession. The plot, however, was at last discovered by the features and dress of the riders; and the chief keeper told us there were only sixty of them.[83]

The elephants in most demand for processions and ceremonies in the East belonged to a special caste or breed. Three such castes are recognized, their differences based on physical type. The names of the castes vary in different regions, so I shall cite only those used in Bengal: *Koomeriah*, *Dwasala*, and *Meerga*. *Koomeriah* means royal or princely, and is the highest caste; *Meerga* is probably a corruption of the Sanskrit *mriga*, meaning a deer, for elephants of this type are lightly built and long in the leg; *Dwasala* means "two things", or "double origin", and is applied to animals intermediate in type between the other two castes. The terms can be regarded as roughly equivalent to thoroughbred, third-rater, and half-breed respectively.

The ideal *Koomeriah* is an exceptionally large and powerful animal, with a deep barrel-like chest and a great girth. His legs, especially the hind pair, are short, but very massive; the front

pair should be convex on the forward side from the development of muscle. The head and chest must be massive, the back sloping slightly from shoulder to tail. The trunk should be broad at the base and proportionately heavy throughout; the eye full, bright and kindly. Pink and white blotches on the face and ears, far from being thought unsightly, greatly enhance the elephant's value. The tail must be long, but should not touch the ground.

By contrast the typical *Meerga* is a miserable specimen. He is lanky, with spindle legs; his trunk is thin, flabby and inert, his head small, and his eyes piggy and dull. The *Meerga's* temperament matches his unprepossessing appearance, and he is often nervous and vicious. His main use is in work where speed is more important than strength, for his long legs make him more nimble and swift-footed than the *Koomeriah*. But in every other respect the *Koomeriah* is to be preferred, and is generally a much more sought-after and valuable animal.

One of the uses of *Koomeriahs* was in the artificially staged elephant fights which were formerly a popular court entertainment in the East. These were often arranged for the delectation of foreign dignitaries, and bore some relation to the contests of the Roman arena. The elephants were either chained by the hind legs at such a distance that only their heads and fore-quarters could be brought into contact, or else they fought across a low wall. Elephants on *musth* were usually chosen when available, and were further maddened by teasing and drugs to make them as aggressive as possible. Immediately before the contest they were given copious drafts of the highly intoxicating spirit known in the East as arrack. As a result of this treatment, the enraged beasts often inflicted such wounds upon each other that one or both of them died.

Elephants artificially maddened in this way were of course unapproachable by men and fought without riders. But a variant of the practice involved the use of mahouts throughout the battle. The seventeenth-century French traveller François Bernier has left a good account of one such contest which he witnessed whilst at Delhi in 1663. He writes:

The festivals generally conclude with an amusement unknown in Europe,—a combat between two elephants; which takes place in the presence of all the people on the sandy space near the river:

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the king, the principal ladies of the court and the omrahs,* viewing the spectacle from different apartments in the fortress.

A wall of earth is raised three or four French feet wide and five or six high. The two ponderous beasts meet one another face to face, on opposite sides of the wall, each having a couple of riders, that the place of the man who sits on the shoulders, for the purpose of guiding the elephant with a large iron hook, may immediately be supplied if he should be thrown down. The riders animate the elephants either by soothing words, or by chiding them as cowards, and urge them on with their heels, until the poor creatures approach the wall and are brought to the attack. The shock is tremendous, and it appears surprising that they ever survive the dreadful wounds and blows inflicted with their teeth, their heads and their trunks. There are frequent pauses during the fight; it is suspended and renewed; and the mud wall being at length thrown down, the stronger or more courageous elephant passes on and attacks his opponent, and putting him to flight, pursues and fastens upon him with so much obstinacy, that the animals can be separated only by means of cherkys, or fire-works, which are made to explode between them; for they are naturally timid, and have a particular dread of fire, which is the reason why elephants have been used with so very little advantage in armies since the use of fire-arms. The boldest come from Ceylon, but none are employed in war which have not been regularly trained, and accustomed for years to the discharge of muskets close to their heads, and the bursting of crackers between their legs.[84]

A more lavish display was sometimes arranged in which whole herds were put to combat. First a stone enclosure, known as a *gal indhikeda*, was built, with an observation platform from which the king and other privileged spectators could watch the fight. Then parties of men would go out into the jungle and locate two herds, which would be driven with the aid of tame elephants towards the enclosure. Bets would be laid as to which herd would reach the enclosure first, and which would win the battle; the king would also offer a prize as an inducement to those who brought in the winning herd.

The entrance to the enclosure was camouflaged with a leafy screen, and the natural vegetation of the jungle was left growing inside. Thus the first herd would often enter it without suspecting that they would be prevented from further progress by

* i.e. the lords or grandees.—R. C.

a wall at the other end. In an open space near the observation platform a pile of special delicacies was left to attract the elephants, who would soon make their way towards these and begin to feed. The second herd was then guided into the enclosure behind them. With two herds thus forced into close proximity in an enclosed space battle was swiftly joined. First the herd-leaders and then several of their followers would begin a ferocious combat, so that the enclosure became a mass of struggling forms. The spectators would scream with delight, each cheering and encouraging the members of his chosen herd. Eventually one of the herd leaders would be forced to break off the contest and turn to run; the gate of the enclosure was then opened, and the defeated herd disappeared into the jungle, followed by their triumphant adversaries and the derisive shrieks of the crowd. The drivers of the victorious herd were rewarded with money and jewels. According to P. E. P. Deraniyagala these herd combats were formerly a favourite feature of the New Year festivities, or *Avurudhu Mangallé* in April. They were followed by displays by the war elephants, which charged and destroyed dummy soldiers stuffed with straw, and by races, acrobatic displays and swimming competitions by other tame elephants.[85]

Returning now to the West, we find that after the collapse of the Roman Empire the elephant was no longer used as an animal for show or entertainment. In fact it entirely disappeared from the western world and became once more a creature of myth and legend. During the thousand years following the fall of Rome only two elephants are recorded as having been brought alive to Europe. The first, a tame specimen named *Aboul-Abbas*, was sent by the Abassid Caliph of Baghdad, *Haroun-er-Reschid*, to Charlemagne in 797. It was landed at Pisa and was received by Charlemagne in Lombardy. It later crossed the Alps with its new owner, and seems to have accompanied him on several of his later travels. In 810 it turned up at *Lippehne* in Germany, where it suddenly died. One of its tusks was made into an enormous hunting-horn which was later exhibited in a church at *Aix-la-Chappelle*. [86] The second specimen was obtained in the Holy Land by St. Louis (Louis IX of France) and presented by him to Henry III of England



17 a) Ceremonial elephants are sometimes beautifully decorated

b) Elephants fighting, Udaipur





18 a) Elephant rides at the London Zoo. From the *Illustrated Times*, October 20th, 1866

b) A Ceylon elephant being landed at the Royal Albert Dock, London, on its way to Whipsnade Zoo (1951)



in 1254. This was the first elephant to reach England since Roman times, when both Cæsar and Claudius are alleged to have taken specimens across the Channel.[87] It is recorded that a house 40 feet long by 20 feet wide was built to hold it, and it immediately became one of the sights of London.[88]

In the sixteenth century, mainly as a result of the opening up of the remoter regions of the Earth by Renaissance explorers, elephants began to make more frequent appearances in western Europe. For example, in 1514 Tristan da Cunha, ambassador of Emanuel I, King of Portugal, presented an Indian elephant to the menagerie of Pope Leo X at the Vatican. The animal made its solemn entry into Rome on March 12th, and when it arrived beneath the window where the Pope and his entourage were assembled it bowed three times as if in homage to His Holiness. It seems, however, that this charming gesture was not a result of the creature's piety, but was due to its mahout having given it three brisk taps on the head with his *hawkus*. As if in defiance of this attempt at conversion the elephant is alleged to have plunged its trunk into a nearby trough of water and soused the spectators, not even excepting the majestic figure of the Pope himself.[89]

Among other sixteenth-century elephants was a specimen belonging to Henry II of France, which lived in his menagerie at Saint-Germain with a camel, some porcupines and monkeys, and a variety of other animals sent back by Pierre Gilles, the French king's emissary in the East. The Emperor Maximilian II also possessed an elephant which in 1552 figured in the magnificent procession to his coronation as king of Hungary. This may have been the same animal which he showed to Henry III of France in Vienna in 1574. Later specimens included one sent from India to Henry IV of France in 1591, and presented by him to Queen Elizabeth I of England, and an African elephant from the Congo which was a popular inmate of the Versailles menagerie from 1665 to 1681. This last quickly acquired the habits of a French gastronome. It was very partial to wine, and insisted on a ration of at least 12 pints daily; it was also given huge pailfuls of soup in which it would dip its bread as dexterously as a modern French taxi-driver taking a snack in the local *bistro*.

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In England during the same period an elephant was put on show "at the Rising Star in St. John's Court, near Clerkenwell-Green"; it had been landed in London on August 3rd 1675 and its virtues are enlarged upon in a broadsheet now framed and hanging in the library of the Zoological Society of London. Another elephant, on show in Dublin, was burnt to death in 1681, and was the subject of one of the first anatomical accounts of the animal ever published.[90] Elephants did not reach America until 1796, when an enterprising sea captain named Jacob Crowninshield imported a two-year-old female from Bengal. She was known as Old Bet, and although there are records of her appearance in various towns and cities in the United States, her ultimate fate is unknown.[91]

By the beginning of the nineteenth century elephants were becoming a fairly familiar sight in zoos and in entertainments devised by astute showmen, but they still continued to draw the public wherever they were exhibited. For example, a famous specimen exhibited at the Adelphi Theatre in London in 1830 caused the house to be packed to capacity every night. A contemporary observer wrote:

The animal took part in the scene with almost undeviating precision; displayed no want of confidence or self-possession in the midst of lights, and music, and the shouts of the people; and made her parting salute with as much grace as if she had Emperors and Popes only to bow to. One of the most curious scenes in which she took a prominent part, was that in which she assisted the escape of the Prince and his adherents from prison, by kneeling upon her hind legs, and thus forming an inclined plane, upon which her friends might safely reach the ground.[92]

This touching episode is well shown in the contemporary engraving reproduced opposite.

Another elephant of the time belonged to the Duke of Devonshire, and was acquired by him in rather unusual circumstances. A lady of rank on her way to India asked him what she should send him back as a present. "Oh, nothing smaller than an elephant!" he replied jokingly. A few months later he received a letter from the lady in question saying that his elephant, a fine cow, would shortly be arriving at the docks. The Duke arranged to accommodate the animal at his house in Chiswick, where she



The elephant exhibited at the Adelphi Theatre, London, in 1830

proved a great attraction to visitors. At a call from her keeper she would come out of her house, take up a broom, and follow his directions in sweeping the lawns or paths. She would carry pails and other objects with the pride of a dog carrying its master's gloves, and was always rewarded for her labours with a carrot. One of the tricks at which she was most adept was opening bottles. She would lay the bottle on its side and hold it in place with her enormous fore-foot. She would then gradually twist out the cork with her trunk, even though it projected very little from the neck; at the moment it was released she would lift the bottle to a vertical position so as not to spill the contents, and then empty it into her trunk without losing a drop. Finally she would hand the bottle politely back to her keeper before discharging the contents of her trunk down her throat.

This same elephant was remarkable for another original trick. Her keeper, when riding her, used to sit on a large cloth, which he draped over her back. When he dismounted he used to instruct her to take off the cloth, which she did, not with her trunk, but by alternatively contracting and relaxing the muscles of her back. The movement of her loose skin caused the cloth gradually to slip to one side, so that eventually it fell in a heap on the ground. The elephant would then carefully spread it out on the grass until it was perfectly flat and fold it up like a table napkin. Finally she would wrap her trunk round the bundle and toss it onto her back, where it would remain as steady as if placed there by human hands.[93]

An elephant story somewhat more difficult to swallow than the above is connected with the showman Pidcock who owned the menagerie at Exeter Exchange. Apparently it was Pidcock's custom to treat himself and his elephant each evening to a glass of spirits—an event to which the elephant (and presumably also the showman) greatly looked forward. Being a courteous man, Pidcock always offered the elephant the first glass out of the bottle; but on one occasion, being afflicted with a greater than usual thirst, he exclaimed: "You've been served first long enough; it's my turn now!" The proud animal was so offended at being denied his customary priority that he refused the glass with disdain and never consented to drink with his owner again.[94]



Elephant in his bath at the London Zoo, 1832

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Elephants were a feature of other menageries besides Piddcock's in the early nineteenth century, including the famous collections of Cross and Atkins. They soon took their place in the Regent's Park Gardens of the Zoological Society of London, whose charter was granted in 1829 for "the introduction of new and curious subjects of the Animal Kingdom". An early favourite here was an Indian elephant named Jack purchased in 1831 for £420. Shortly after his arrival an enthusiastic visitor wrote to the Assistant Secretary suggesting that Jack's keeper should be dressed "in something of an Asiatic costume". It was to be simply designed so that it could be taken on and off in a few seconds, and a sketch was included to elucidate the description. "The elephant thus attended," added the writer, "and placed in . . . your beautiful North Garden, will fancy himself at home, and visitors suppose themselves transported into Asia." Whether this dream was ever realized is not recorded, but Jack certainly seems to have been considerably pampered during his stay at the Zoo. A lady was given the concession of selling "for the use of the elephant alone, rolls, cakes and fruit" (although not, as the terms of her agreement very properly stipulated, fermented or effervescing liquor); this arrangement must have been very popular with both the concessionaire and the elephant, for a paragraph in *The Times* records that she sold in one day cakes and buns to the value of thirty-six shillings, "all of which the elephant devoured".

Jack survived until 1847, and W. J. Broderip, one of the original Fellows of the Zoological Society, has left an account of his last days. After visiting the elephant on Whit Sunday, 1847, with two other distinguished scientists, Sir Roderick Murchison and Sir Richard Owen, he wrote:

The elephant was miserably fallen away, and stood, as he had long previously remained, supporting himself by laying his huge trunk along the bar that fronted his apartment. He was evidently suffering much, and the keeper warned me not to go near, his temper having become ferocious. I knew him well, however, and ventured to approach; and he threw up his trunk and showed his molar teeth in his open mouth at my usual signal. I had nothing to give him but bran, and that he took from my hand.

Jack was kept secluded for some time, but showed no signs



The dead elephant "Jack" at the London Zoo, by George Landseer. From *The Illustrated London News*,
June 19th, 1847

of improvement. Eventually he sank back on his haunches, his forelegs extended, and remained motionless for about two hours. Then his trunk dropped and he expired, stiffening in the upright position, not even his head sinking. Investigation showed that he had been suffering from extensive disease of the knee-joint and an abscess in the throat.[95]

The London Zoo's most famous elephant was of the African, not the Asiatic, genus. This was Jumbo, the first African elephant to be brought alive to England, whose career and ultimate fate caused a sensation in two continents. The story begins on June 26th 1865 when Jumbo was received in exchange for an Indian rhinoceros from the Jardin des Plantes in Paris. He was then a young animal, measuring some 5 feet 6 inches in height and 9 feet 6 inches in girth. Three months later the Zoo bought a second African elephant, a female named Alice; she was somewhat smaller than Jumbo, and had been collected in the Sudan by an Italian traveller named Casanova (not the author of the *Memoirs*). The two animals settled down well in adjacent stalls, and Jumbo soon became a popular favourite with visitors both as a riding animal and an amiable and capacious receptacle for buns.

All went well until 1881 when Jumbo, as is not unusual with older African bull elephants, began to show signs of unreliable temper. He did considerable damage to his stall, which had to be reinforced with stout timber buttresses. He was, of course, immediately withdrawn from service as a riding animal, and shortly afterwards A. D. Bartlett, the Zoo's Superintendent, was obliged to make a report on his condition to the Zoological Society's Council. This was reprinted in *The Times* for December 14th 1881 and read as follows:

I have for some time past felt very uncomfortable with reference to this fine animal, now quite, or nearly quite, adult, and my fear of him is also entertained by all the keepers except Matthew Scott, who is the only man in the Gardens who dare enter this animal's den alone. I have no doubt whatever that the animal's condition has at times been such that he would kill anyone (except Scott) who would venture alone into his den, but up to the present time Scott has had, and still has, the animal perfectly and completely under his control. How long this state of affairs may continue it

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is quite impossible to say. At the same time, I consider that the matter is of so serious a nature that I feel called upon to draw the attention of the Council to the subject, for in the event of illness or accident to the keeper (Scott) I fear I should have to ask permission to destroy the animal, as no other keeper would undertake the management of this fine but dangerous beast.

In conclusion, I may ask that I should be provided with, and have ready at hand, the means of killing this animal should such a necessity arise.

A. D. BARTLETT.

The serious tone of this communication could not be disregarded, but before the Council had decided what action to take, an offer to purchase Jumbo was received from the American showman P. T. Barnum. As it seemed possible that the animal might in any case have to be destroyed, the Council decided that to sell to Barnum would probably be the most satisfactory way out of a difficult dilemma. The appeal of such a famous elephant to a showman would obviously be enormous, and a good price should certainly be obtained. They asked £2,000 and Barnum accepted immediately by telegraph. The only condition imposed by the Society was that the price was for the elephant "as he stands", Bartlett being of the opinion (which proved to be only too correct) that the boxing and transportation of Jumbo across the Atlantic would be a task to tax even Barnum's ingenuity.

The first news of the deal was given in *The Times* of January 25th 1882, and caused a reaction of horror and dismay that could only have been exceeded by the sale to the Americans of Queen Victoria herself. Jumbo was a national institution, and his departure for foreign shores was regarded as a slur upon the honour and patriotism of all true Englishmen. The conduct of the Council was compared with that of American slave dealers, and a Zoological Society Defence Fund was instituted to save Jumbo for the nation. On March 6th the organizers of the Fund, who included some dissident Fellows of the Zoological Society, made application in the Chancery Division to Mr. Justice Chitty for an injunction restraining the Council from carrying out their iniquitous purpose. An interim injunction

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was granted, but was later withdrawn after more responsible testimony had been heard.

Meanwhile the Council was assailed on all sides by a mounting tide of indignation and sentimentality. Cartoonists had an extended field day depicting Jumbo with tears streaming down his face at the prospect of leaving his old home, and Alice was cast in the role of the sorrowing and desperate wife whose only true love was about to be torn from her bosom. This was, of course, nonsense; the two animals had never even shared a stall, and Bartlett was well aware that had they been placed together Jumbo was as likely to have made a violent attack on Alice as to have given her one of the tender caresses which newspaper artists were now so eager to depict.

In addition to much blackguarding of the Zoological Society, hundreds of personal appeals went to Barnum himself. The following example is typical of many:

TUNBRIDGE WELLS, KENT.

DEAR SIR—You would receive the deepest and most grateful thanks of the whole of the British nation, if you would only forego your bargain about poor, dear Jumbo. You are so well known as the greatest showman in the world, do be known now as the most generous-minded man. I have always found American gentlemen to be every thing that was good, kind, and chivalrous; and I hope you will show yourself a king among them. We are all so attached to Jumbo, and he to his home, that it would be really cruel to move him. He deserves to remain, I'm sure, for his fidelity to all his surroundings, and his good temper under all his present trials. I know the American mind is so large, that I have quite expected each day to see in the papers that you would let Jumbo remain in his old home. In fact, I have all along thought it one of your jokes. Praying that you may change your mind, and that this letter may arrive in time to assist to that end, I remain,

ONE OF JUMBO'S SINCERE FRIENDS.

P.S.—I am sure you will never regret leaving Jumbo in peace.

The campaign for Jumbo next received the backing of the *Daily Telegraph*, whose editor sent Barnum the following telegram:

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P. T. BARNUM, NEW YORK.—Editor's compliments. All British children distressed at elephant's departure. Hundreds of correspondents beg us to inquire on what terms you will kindly return Jumbo. Answer prepaid, unlimited.

LESARGE.

This appeal seems to have affected Barnum as little as the rest for he replied as follows:

My compliments to editor *Daily Telegraph* and British nation. Fifty millions of American citizens anxiously awaiting Jumbo's arrival. My forty years invariable practice of exhibiting best that money could procure, makes Jumbo's presence here imperative. Hundred thousand pounds would be no inducement to cancel purchase. . . .

P. T. BARNUM.*

Unlike other episodes in the Zoo's history, the impending tragedy seems to have been too sombre a theme for music-hall quips, but it did inspire a number of popular melodies, elegiac or defiant according to the particular emotional bias of the composer. The most famous of these were *Jumbo's March* and *Why Part with Jumbo (the Pet of the Zoo)*, both published as sheet music with full colour representations of their subject on the cover. The former was not accompanied by words, but the composer, one George Barnham, had spared no pains to see that it was played as graphically as possible. The different sections were headed with indications of their significance such as the following: "Jumbo's March round the Zoo" (*grandioso*, of course); "Jumbo being fed by his juvenile Friends"; "Children mounting on Jumbo"; "Jumbo's Wrath on hearing that Barnum has bought him"; "Coaxing him to start on his Journey"; "More Wrath" (*ff*); "More coaxing" (*mf*); "Alice's Despair" and "Jumbo's Embarkation and Farewell". By contrast *Why Part with Jumbo* (composed by E. J. Symons with words by G. H. MacDermott) was less portentous. The lyric, which made

* I have not been able to trace the original text of these telegrams, and they are therefore given here as printed in William Holder's book *The Ivory King*, 1886, pp. 66-7. The name Lesarge is an obvious misprint for Le Sage—i.e. Sir John Merry Le Sage, who was Managing Editor of the *Daily Telegraph* from 1882 to 1923.



Jumbo worship at the London Zoo, 1882. From a contemporary cartoon

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up by the fervour of its emotions for certain shortcomings in its literary style, ended as follows:

*And if Mr. Barnum you take him away,
For our sakes, Flo, Fannie, and Bell,
And Maggie and Harry, Fred, Ernest, and George,
Who love dear old Jumbo so well,
Be kind to the darling and please let us know,
Every post where you take Jumbo to,
And when he is tired and wants to come home,
Please bring him safe back to the Zoo.*

But in spite of these inspired compositions and the grief of the nation's children the withdrawal of the injunction by Mr. Justice Chitty made it clear that Jumbo's fate was sealed. The next thing was to box him up. As Bartlett had suspected, this proved to be no easy task, and it was several days before Matthew Scott succeeded in luring him into the gigantic crate supplied by Mr. Barnum's emissaries. Even then there was a snag, for Jumbo put his trunk through the bars of his crate and pulled some hairs from one of the horses' tails; this caused the whole team to bolt, and it was only by the skill of the wagoner that a dangerous emergency was averted.

Jumbo eventually sailed for America on the *Assyrian Monarch* on March 25th 1882. A great crowd of his friends, including many of the nobility, came to see him off, and he was treated to all manner of presents ranging from the halfpenny buns of the school children to champagne and oysters provided by an eccentric peer. He arrived in New York on April 9th, and for three years delighted the Americans as he had formerly delighted the British. His career might have been much longer, for he was still little more than twenty-five years old, but on the evening of September 15th 1885 he met with a tragic accident. While leaving the circus grounds at St. Thomas, Ontario, he was struck by a train and died within a few minutes. His body, stuffed by Professor Henry Ward of Ward's Natural Science Establishment at Rochester, can still be seen at Tuft's College in Boston; his skeleton is in New York, at the American Museum of Natural History.

Barnum possessed a large herd of elephants apart from

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Jumbo, and he exploited the popularity of the beasts most effectively to obtain publicity for himself and his circus. But sometimes the publicity was not exactly of the kind he would have wished, especially when, as sometimes happened, his elephants ran amok. The greatest elephant panic ever to have occurred in the United States was caused by Barnum's elephant Emperor, which suddenly went on *musth* and became entirely unmanageable. The first signs of Emperor's condition became apparent when he was being taken to the train after a performance at Troy, N.Y. Usually a docile animal, he now showed great resistance to being handled, roaring and trumpeting and swiping wildly at the onlookers with his trunk. At length he got quite out of control and bolted down the street, obviously bent on mischief. His first call was at an iron foundry, which he entered screaming by the large front door. The staff hastily retired by the back, leaving the elephant to expend his violence on the equipment. But unfortunately everything he touched was red hot, and after trampling on flaming coals and molten metal, and burning his sensitive trunk on the furnaces, he emerged into the outside world in a more malevolent frame of mind than ever. He dashed through the crowded streets of Troy, trampling men and women underfoot and causing a reign of terror lasting several hours. One man was tossed twenty feet into the air, another had a thigh broken, and a woman was snatched from the doorway of a house and thrown against a wall. By the time Emperor was eventually destroyed he had done some four thousand dollars worth of damage to persons and property.

One of the most curious stories about circus elephants concerns the appearance of the famous trick elephant Pickaninny as a witness in court. The episode occurred during the last century at Cleveland, Ohio, where Pickaninny was appearing in a show. Apparently there had been some discussion about his maximum speed, and his trainer had wagered that he could travel three miles in half-an-hour. The matter was put to the test and the elephant completed the first mile in eight minutes. At this point, however, the local Society for the Prevention of Cruelty to Animals intervened, accusing the trainer of using his *hawkus* to such excess that he had drawn blood. The matter

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came up in court, and the trainer subpoenaed Pickaninny for his defence. The animal arrived at the appointed hour, but unfortunately the court had not been constructed to accommodate so bulky a witness and he was unable to squeeze himself up the narrow staircase. Obliging the magistrate agreed to hold the case in the entrance hall, and the elephant duly took the stand. Counsel asked if he had been hurt, and he shook his head vigorously from side to side; when asked if he was generally well treated he nodded and made grunts of assent. Whether the course of justice was altered by this testimony is unlikely (especially as the trainer seemed to be not unconnected with the performance); but when examination confirmed that the elephant was in good condition and quite unharmed the man was discharged. Pickaninny was congratulated by all present, and received loaves of bread, fruit, and other delicacies as a reward for his loyal support.[96]

The ability of elephants to learn tricks is remarkable, and modern training techniques have achieved results far beyond those known in classical times. Elephants can now be taught to balance upon a rolling ball, to perform on a see-saw, to ride bicycles and drive in jeeps, and even to play cricket and football. Whether it is desirable to teach elephants these things is another matter, and I do not personally care for the exploitation of animals for personal profit or mass amusement. On the other hand, it must be admitted that elephants take particularly well to instruction of this kind, and go through their paces with every appearance of enjoyment.

A striking example of elephant training in the last century was provided by a young elephant known as Tom Thumb, who was a member of Barnum's circus at the same time as Jumbo. This animal, dressed in hat, coat and trousers, used to walk on its hind legs to a table set upon a small platform. It was escorted by an alleged German in comic apparel, the man and elephant taking their places at opposite sides of the table. The elephant would then take a handbell in its trunk, ring for a waiter, and give him an order for drinks. When the waiter had returned with a bottle and two glasses, the elephant used to take the former while his companion was looking the other way, and empty its contents down his throat. The performance was

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repeated several times, the "German" on each occasion not noticing the fraud, until at last the elephant began to show unmistakable signs of intoxication. Finally the animal would take a fan in its trunk and wield it vigorously before tottering off the stage with an assumed stagger to the delighted applause of the spectators.

The methods used for training circus elephants were explained to me by John Gindl, who has trained elephants and other animals for Bertram Mills' Circus for over a quarter of a century. He stressed that individual elephants vary enormously in their capacity to absorb instruction. Some pick up what is expected of them in a few days, while others take weeks or even months to learn the same thing. Elephants can be trained without distinction of age or sex, but cows are mostly used as they are more trustworthy than bulls. The Asiatic species is usually preferred because of its greater docility, but African elephants have also appeared on several occasions in the circus ring. For instance, the Circus Knie in Switzerland has achieved spectacular success with these animals, who have proved to be almost as reliable and teachable as their Asiatic cousins.

Some training achievements with elephants exhibit the highest degree of virtuosity. In Gindl's cricketing act, for example, a pair of elephants take up their station at opposite ends of the arena. One wears a cap and pads and carries a bat in its trunk, while the other bowls. On either side two or three other elephants are ranged as fielders. At the word of command the "bowler" throws the ball down the pitch and the "batsman" takes a ferocious swipe at it with his trunk. More often than not the bat connects, and the elephant trundles off across the arena for a run. Meanwhile one of the fielders retrieves the ball and throws it at the stumps. The act causes the spectators immense amusement, and the fun is obviously shared by the elephants themselves.

It took Gindl several months of patient effort to bring this act to perfection. He began by standing in front of the batsman elephant, grasping both bat and trunk in his own hands. A helper would then bowl the ball and Gindl would guide the elephant's trunk to hit it. After many hundred tries the animal



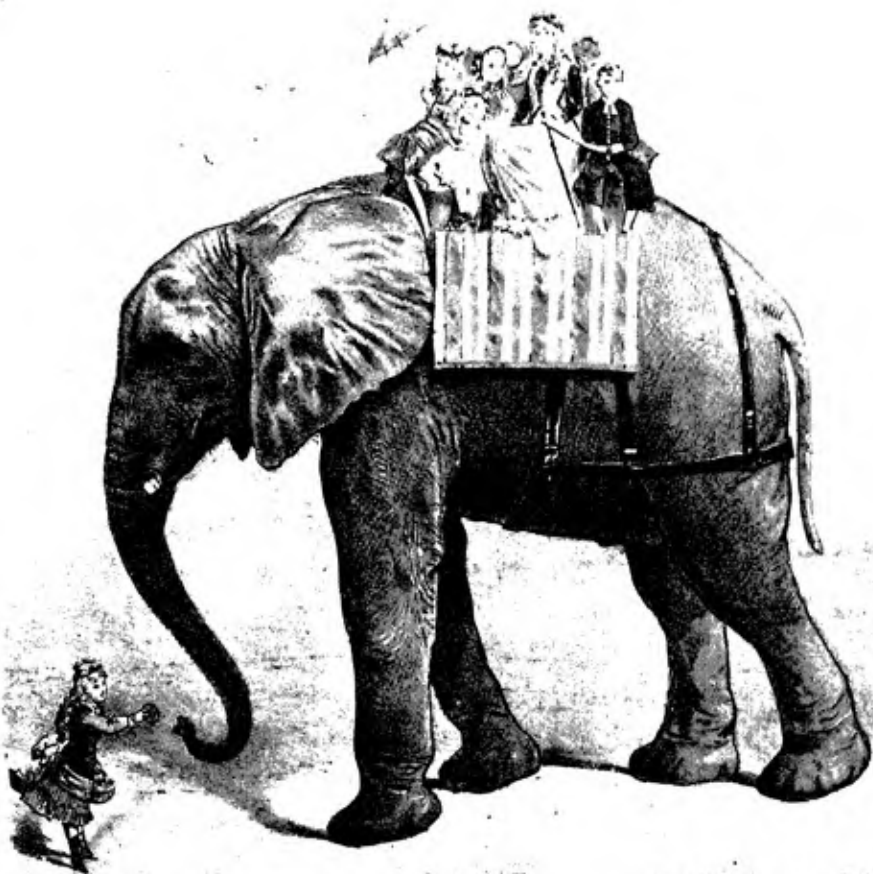
19 a) 'The great African elephant 'Jumbo' at the London Zoo, about 1880

b) Jumbo leaves for America. From the *Illustrated London News*, April 1st, 1882



WHY PART WITH JUMBO,

(THE PET OF THE ZOO.)



WRITTEN BY
G. H. MACDERMOTT.

MUSIC BY
E. J. SYMONS.

LONDON: HOPWOOD & CREW, 42, NEW BOND ST W.

Pr. 4

20 Cover of sheet music published in 1882, protesting against Jumbo's departure

grasped the idea and hit the ball on its own. A similar technique was then used with the bowler and fielders, until all the elephants began to enter into the spirit of the thing. Thereafter there was no holding them, and they would play the game with the enthusiasm of boys having a knock-up on the village green.

The essence of training circus elephants, and in fact all animals, is kindness. Harsh words must never be used, and some trainers have even dispensed with the use of a goad to direct the animals at their tasks. Shameless bribery with sugar is much more effective than constant jabs with the *hawkus*. Gindl told me he does not regard the elephant as particularly intelligent, but rather as possessed of a long memory and exceptional docility. It is very slow to learn, but once it has mastered a trick it will repeat it faultlessly as often as the trainer wishes, even after long lapses of time.

These views are borne out by the results of a recent series of experiments carried out by Professor B. Rensch of Munster University in Germany which were reported in *The Times* for March 15th 1957. Rensch's object was to apply to the elephant certain intelligence tests of a kind bearing some relation to the tests now applied along scientific lines to human children. He had at his disposal a five-year-old Asiatic elephant, and he aimed to examine the speed with which the animal could associate certain shapes with a reward in the form of food. The apparatus consisted simply of two wooden boxes with changeable cardboard lids. The lids were marked with two different symbols, in the first instance a square and a circle. The box marked with a square contained food; that marked with a circle was empty. The elephant needed no fewer than 330 trials before it grasped the distinction. Further pairs of symbols were then used, which the elephant mastered progressively more quickly, until by the time the fourth pair had been introduced only ten unsuccessful trials were made. Altogether twenty such pairs were used and, to conclude the experiment, the elephant went through all of them thirty times in a few hours with very few mistakes. A year later the test was repeated with thirteen of the same pairs, and with the exception of one pair—the most difficult—the animal scored between 73 % and 100 % in

each case. These results confirm the view that elephants are not sufficiently intelligent to grasp an idea easily or quickly in the early stages, but once it has penetrated to their somewhat slow brains it is virtually ineradicable. The old saying that "an elephant never forgets" is thus found to be vindicated by modern methods of scientific investigation.

Circus elephants are exceptionally valuable for scientific study, because they are accustomed to the presence of men at all hours of the day and night. This fact has been particularly useful in studying their sleeping habits. Mention was made earlier (Chapter Two) of Dr. Francis Benedict's studies of the slumbers of the elephant Jap, but she was by no means the only circus elephant to have been employed in scientific research of this kind. For instance, Benedict used an Indian cow named Eva for an important series of experiments on the pulse rate of sleeping elephants. An extraordinary fact to emerge from these investigations was that the pulse of an elephant beats considerably faster when it is asleep than when it is awake. This is of course the opposite of what one would normally expect. The amiable Eva allowed the scientists to apply the electrodes of a cardiometer to her hide, and it was discovered that while her pulse rate when awake was 34, it increased to over 40 when she was in a deep sleep. This strange characteristic has not been found in any other animal, and is typical of the interesting scientific discoveries that can be made from a study of elephants under circus conditions.

CHAPTER FOURTEEN

Elephants in Art, Religion, Magic, and Folklore

PROBOSCIDEANS first appear in art in the Upper Palæolithic Period, some sixty thousand years ago. Paintings and engravings of the mammoth and the straight-tusked elephant are commonly found in the caves of the time and on pieces of ivory, horn, or bone used as arrow-straighteners or for other purposes. Some of these are of particular quality and interest, such as the



The elephant of Pindal, showing the animal's heart

mammoths of Les Combarelles and Font-de-Gaume in France and the elephant of Pindal in Spain, which shows the animal's heart. The significance of the designs was probably partly decorative and partly ritualistic, the latter influence greatly predominating. Our primitive ancestors believed that to draw an image of an animal would automatically give them power over it, and therefore be of use to them in the hunt. Survivals of this

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belief can still be found today—for instance, during a recent journey in North Africa I learnt that the Berbers and Arabs were most reluctant to have their photographs taken, believing that the photographer would thereby obtain some hold over them. And even in England simple folk believed until quite recently that harm could be done to an enemy by modelling him in clay or wax and then piercing his image with pins.

Since Stone Age times elephants have been a popular subject with primitive artists in Africa and the East. They are depicted both in engravings on rock faces and the walls of caves and as

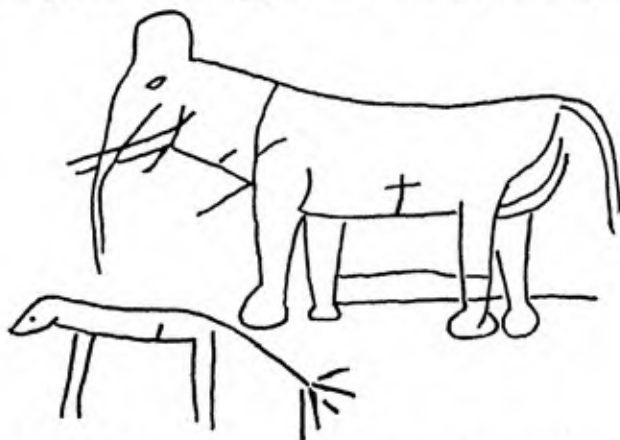


Rock painting of an elephant hunt from Thorn River, Cathcart, South Africa. After Dorothea Bleek

wood carvings. Rock engraving is no longer practised, or only to a very limited extent, but in Africa wood carving remains a flourishing art. In Rhodesia and the Transvaal, paintings are also found, some of them scarcely less remarkable than the frescoes in the palæolithic caves of western Europe. None of these art forms has been influenced until very recently by European techniques, and many of the representations of elephants show a primitive vigour and originality of vision which is most refreshing. The rock drawings are, in fact, far superior to those found in the East, where civilization made its impact on primitive art at a much earlier stage. One odd characteristic of some of the eastern drawings is that the pos-

teriors of the animals are shown projecting backwards so as to overhang the hind limbs. Such falsification of the natural appearance of the animal is seldom committed by African artists, whose drawings are in general extremely well observed.

The elephant has been equally popular with artists in civilized communities, and has been depicted in every medium. In ancient times one particularly common use of its image was on coins and medals, for it was regarded as a symbol of power and longevity. An example was shown on page 196, and others are given on page 222. The upper coin is one of a number issued in



Outline drawing of an elephant and another unidentified mammal in a Ceylon cave

Spain at the time of Hannibal's campaigns and shows an unmistakable African elephant. The medal, below left, is believed by some antiquaries to represent Alexander the Great in the head-skin of an elephant, and may have been struck to commemorate his victory over the elephants of Porus. The coin on the right belongs to a later period, and represents the elephant's supposed habit of worshipping the sun, the moon, and the stars. This last belief, incidentally, is referred to by Pliny, who writes:

The elephant . . . has a religious respect also for the stars, and a veneration for the sun and moon. It is said by some authors, that, at the first appearance of the new moon, herds of these animals come down from the forests of Mauritania to a river, the name of which is Amilo; and that they there purify themselves

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in solemn form by sprinkling their bodies with water; after which, having thus saluted the heavenly body, they return to the woods, carrying before them the young ones which are fatigued.[97]

The belief was still referred to right down to the seventeenth century, and in Athanasius Kircher's *China Monumentis, etc.*,



Elephants depicted on ancient medals and coins (see Text p. 221)

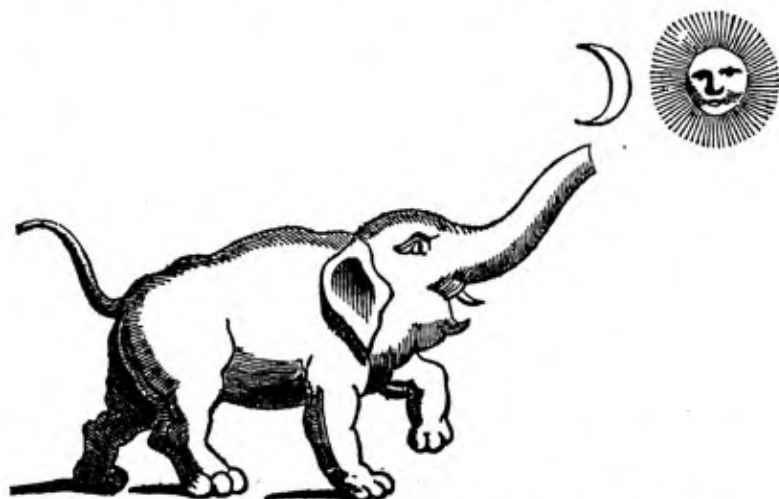
published in 1667, there is a delightful picture of an elephant worshipping the sun and the new moon at the same time.

Elephant sculptures and figurines are particularly popular in the East, some possessing religious significance, others being simply decorative in intent. The main use of the elephant in eastern religious art is in representations of Ganesa, the great Hindu god of wisdom and prudence, who is always depicted

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with an elephant's head, perhaps to indicate his sagacity. Elephants also appear on temples and public buildings of all periods, either in low or high relief, or as sculptures on such masterpieces of oriental art as the ornamental gateways at Sānchi, or the supports of the Kailāsa temple at Ellora. Another popular use for the animal is on tile-mosaics, such as the vital and humorous examples found on the west and north walls of the Lahore Fort.

In western art the elephant was usually regarded as a symbol

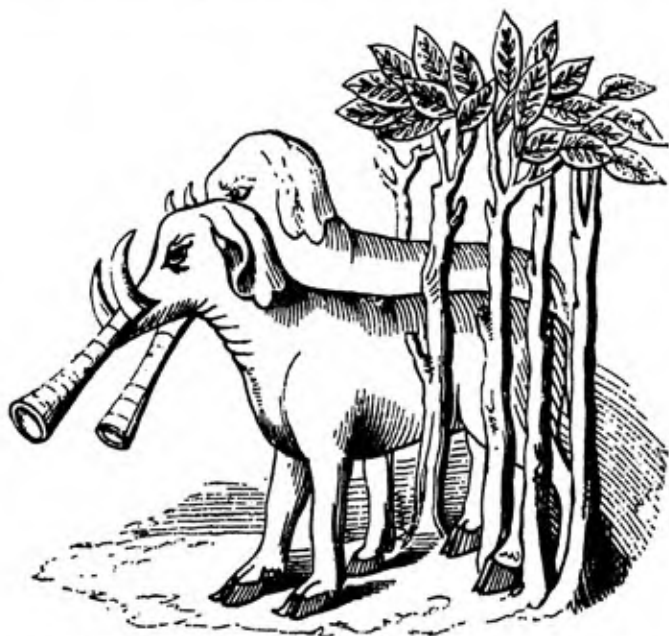


Elephant worshipping the sun and moon. After Kircher (1667)

of dignity or exoticism, but its effectiveness in these roles was diminished for many centuries by ignorance of its anatomy. Medieval and early Renaissance artists often committed entertaining howlers in trying to depict elephants from the scanty and inaccurate data which was all they had available. The example shown on page 224, which is reproduced from a fifteenth-century manuscript in the British Museum,[98] is a particularly amusing example of a misconception of this kind. Even the somewhat more realistic elephant depicted by Gesner, Topsell and Aldrovandi (see page 225) was shown with a trunk more reminiscent of an attachment to a vacuum cleaner than an organ made of flesh and blood.

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Apart from the visual arts, elephants have played a part in literature, in music, and even (through the genius of Mr. Walt Disney) in ballet. Enough passages have already been quoted to show the interest they evoked in ancient writers, but they have also figured largely in the works of poets, essayists and novelists of later generations. "For mayst thou sormounten



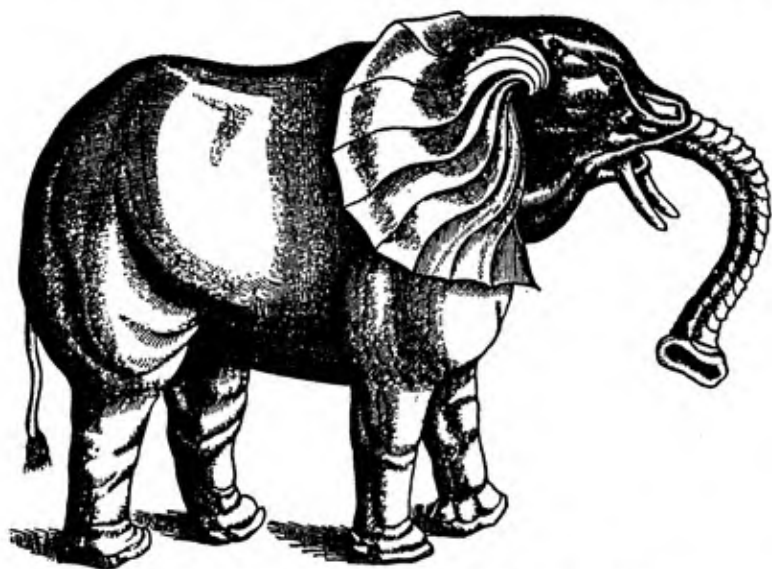
Elephants. After Royal MS. 15.e.vi in the British Museum

thise olifaunts in gretnesse or weight of body?" asks Chaucer rhetorically in *Boethius*;[99] and Spenser, in the *Faery Queen*, compares the ears of the "wilde and salvage man" who kidnapped Amoret to "th'eares of Elephants by *Indus* flood".[100] Shakespeare must have known how elephants were caught in pitfalls, for he makes Decius say of Caesar:

. . . . he loves to hear
That unicorns may be betray'd with trees,
And bears with glasses, elephants with holes,
Lions with toils, and men with flatterers.[101]

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But he also accepted the old fiction, dating from classical times, that the animals cannot bend their legs, for in *Troilus and Cressida* Ulysses comments: "The elephant hath joints, but none for courtesy: his legs are legs for necessity, not for flexure." [102]



The Elephant, as depicted in Topsell (1607) and other Renaissance natural histories

The same mistaken idea, and a few more besides, were perpetuated by John Donne in a delightful passage in *The Progress of the Soul* (Stanza 39):

Natures great master-peece, an Elephant,
The onely harmlesse great thing; the giant
Of beasts; who thought, no more had gone, to make one wise
But to be just, and thankfull, loth to offend,
(Yet nature hath given him no knees to bend)
Himselfe he up-props, on himselfe relies,
And foe to none, suspects no enemies,
Still sleeping stood; vex't not his fantasie
Blacke dreames; like an unbent bow, carelesly
His sinewy Proboscis did remisly lie.

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Later writers have maintained this interest in the elephant, and it plays the star role, or is at least an important character actor, in much recent literature. Rudyard Kipling's *Kim* and *The Elephant's Child* are perhaps the best known examples of its appearance in English fiction; in France in 1956 Romain Gary took it as a symbol of victimized humanity in his Goncourt Prize novel *Les Racines du Ciel*. The twentieth century has also produced my own favourite piece of elephant writing in George Orwell's essay *Shooting an Elephant*, as well as the most popular of all elephant poems:

*When people call this beast to mind,
They marvel more and more
At such a LITTLE tail behind,
So LARGE a trunk before.*

It is hardly necessary to add that this last is the work of the late Mr. Hilaire Belloc.

The inspiration provided by the elephant in music has already been mentioned in connection with the story of Jumbo. A more elaborate example is provided by the Elephant Song from *Wang*, a comic opera by J. Cheever Goodwin produced on May 4th 1891 in New York. The lines:

*And he swore like mad because he had
An elephant on his hands,*

became sufficiently famous to attain a permanent place in *Stevenson's Book of Quotations*. Sound pictures of the elephant also occur in the work of more serious composers—for example, *The Carnival of the Animals* by Saint-Saëns, and Debussy's *Children's Corner Suite*. Perhaps in believing that elephants have influenced choreographers I may be accused of cheating, although not I hope by those who were delighted by Disney's humorous essay in *Fantasia*.

Turning now to the place of the elephant in religion and mythology, we find that the cult is mainly restricted to the East, being based on the worship of the elephant-headed god Ganesa, and on the quasi-religious, quasi-political role played by the white elephant at the courts of Oriental rulers. But these aspects of elephant worship are now very much on the wane, especially

the cult of the white elephant, which today possesses little of its former appeal. Such white elephants as survive in the East are no longer the subject of special veneration. They are mainly kept as curiosities, or as adjuncts to the tourist trade, and fulfil as strictly commercial a role in the modern East as do the bones and other relics of saints in some of the religious practices of western Europe.

But at one time the white elephant enjoyed immense symbolic importance in the East. Even ordinary elephants were venerated for their size and strength, and the white elephant had the additional virtue of rarity. It was simply an albino specimen of the ordinary species *Elephas maximus*, with pink and yellow eyes, white patches at the edge of the ears and at the top of the trunk, white toe-nails, and red hair. Very rarely the whole skin showed a creamy tinge, but more often this was reddish brown, and not much lighter than the normal elephant grey. An animal with a really pale skin, such as that seen by John Crawford at the court of Ava in 1827 (see Plate 23a), was almost beyond price; more often than not an elephant with much less pronounced albino characteristics was accepted as a "white" elephant.

The esteem in which the white elephant was formerly held would have been the envy of many a western courtier. In fact it was regarded as so sacrosanct that not even the king himself might mount on its back. Thus, in the English edition of Simon de La Loubère's *A New Historical Relation of the Kingdom of Siam* (1693) we read: "The King of Siam never mounts the white Elephant, and the reason which they give is, that the white Elephant is as great a Lord as himself, because he has a King's soul like him." [103] The animals were equipped with the finest ceremonial garments, and lived a life of such pampered luxury that many of them succumbed from indigestion. When young calves were captured it was even the custom for them to be suckled by human wet nurses. Each animal received a crown to show its coequal status with the king, and men of the highest rank were deputed to wait upon it. Anyone responsible for capturing a white elephant received great rewards in money and precious stones, and was elevated to a position of honour close to the king. The elephant itself was anointed with precious oils, was prayed for in the temples, and was brought votive

offerings from the faithful. If it fell sick it was attended by the highest physician in the land, and when it died its brains and heart were honoured by a royal cremation.

Anna Leonowens, who was resident at the court of Siam in the second half of the nineteenth century, has left a fascinating account of how a white elephant would be received by the king, and of its subsequent life at court. She writes:

When the governor of a province of Siam is notified of the appearance of a white elephant within his bailiwick,* he immediately commands that prayers and offerings shall be made in all the temples, while he sends out a formidable expedition of hunters and slaves to take the precious beast, and bring it in in triumph. As soon as he is informed of its capture, a special messenger is despatched to inform the king of its sex, probable age, size, complexion, deportment, looks, and ways; and in the presence of his Majesty this bearer of glorious tidings undergoes the painfully pleasant operation of having his mouth, ears, and nostrils stuffed with gold. Especially is the lucky wight—perhaps some half-wild woodsman—who was first to spy the illustrious monster munificently rewarded. Orders are promptly issued to the woons and wongses† of the several districts through which he must pass to prepare to receive him royally, and a wide path is cut for him through the forests he must traverse on his way to the capital. Wherever he rests he is sumptuously entertained, and everywhere he is escorted and served by a host of attendants, who sing, dance, play upon instruments, and perform feats of strength or skill for his amusement, until he reaches the banks of the Meinam, where a great floating palace of wood, surmounted by a gorgeous roof and hung with crimson curtains, awaits him. The roof is literally thatched with flowers ingeniously arranged so as to form symbols and mottoes, which the superior beast is supposed to decipher with ease. The floor of this splendid float is laid with gilt matting curiously woven, in the centre of which his four-footed lordship is installed in state, surrounded by an obsequious and enraptured crowd of mere bipeds, who bathe him, perfume him, fan him, feed him, sing and play to him, flatter him. His food consists of the finest herbs, the tenderest grass, the sweetest sugar-cane, the mel-lowest plantains, the brownest cakes of wheat, served on huge trays of gold and silver; and his drink is perfumed with the fragrant flower of the *dok mallee*, the large native jessamine.

* i.e. district.—R. C.

† i.e. local headmen.—R. C.

IN ART, RELIGION, MAGIC, FOLKLORE

Thus, in more than princely state, he is floated down the river to a point within seventy miles of the capital, where the king and his court, all the chief personages of the kingdom, and a multitude of priests, both Buddhist and Brahmin, accompanied by troops of players and musicians, come out to meet him, and conduct him with all the honors to his stable-palace. A great number of cords and ropes of all qualities and lengths are attached to the raft, those in the centre being of fine silk (figuratively, "spun from a spider's web"). These are for the king and his noble retinue, who with their own hands make them fast to their gilded barges; the rest are secured to the great fleet of lesser boats. And so with shouts of joy, beating of drums, blare of trumpets, boom of cannon a hallelujah of music, and various splendid revelry, the great Chang Phooouk* is conducted in triumph to the capital.

Here in a pavilion, temporary but very beautiful, he is welcomed with imposing ceremonies by the custodians of the palace and the principal personages of the royal household. The king, his courtiers, and the chief priests being gathered round him, thanksgiving is offered up; and then the lordly beast is knighted, after the ancient manner of the Buddhists, by pouring upon his forehead consecrated water from a chank-shell. . . .

For seven or nine days, according to certain conditions, the Chang Phooouk is fêted at the temporary pavilion, and entertained with a variety of dramatic performances; and these days are observed as a general holiday throughout the land. At the expiration of this period he is conducted with great pomp to his sumptuous quarters within the precincts of the king's palace, where he is received by his own court of officers, attendants, and slaves, who install him in his fine lodgings, and at once proceed to robe and decorate him. First, the court jeweller rings his tremendous tusks with massive gold, crowns him with a diadem of beaten gold of perfect purity, and adorns his burly neck with heavy golden chains. Next his attendants robe him in a superb velvet cloak of purple, fringed with scarlet and gold; and then his court prostrate themselves around him, and offer him royal homage.

When his lordship would refresh his portly person in the bath, an officer of high rank shelters his noble head with a great umbrella of crimson and gold, while others wave golden fans before him. On these occasions he is invariably preceded by musicians, who announce his approach with cheerful minstrelsy and songs.

* i.e. White Elephant.—R. C.

ELEPHANTS AND MAN

If he falls ill, the king's own leech* prescribes for him, and the chief priests repair daily to his palace to pray for his safe deliverance, and sprinkle him with consecrated waters and anoint him with consecrated oils. Should he die, all Siam is bereaved, and the nation, as one man, goes into mourning for him. But his body is not burned; only his brains and heart are thought worthy of that last and highest honour. The carcass, shrouded in fine white linen, and laid on a bier, is carried down the river with much wailing and many mournful dirges, to be thrown into the Gulf of Siam.[104]

Immediately a new white elephant was captured and installed at court a speech was delivered to it to persuade it to accept its new environment with a good grace. Here is an example of one of these which, with slight modification, can be confidently recommended to modern Zoo directors:

With holy reverence we now come to worship the angels who preside over the destiny of all elephants. Most powerful angels, we entreat you to assemble now in order that you may prevent all evil to His Majesty the King of Siam, and also to this magnificent elephant which has recently been brought. We appeal to you all, whom we now worship, and beg that you will use your power in restraining the heart of this animal from all anger and unhappiness. We also beg that you will incline this elephant to listen to the words of instruction and comfort that we now deliver.

Most royal elephant! We beg that you will not think too much of your father and mother, your relatives and friends. We beg that you will not regret leaving your native mountains and forests, because there are evil spirits there that are very dangerous, and wild beasts are there that howl, making a fearful noise, and there too that bird 'hassadin' which hovers round and often picks up elephants and eats them; and there are also bands of cruel hunters who kill elephants for their ivory. We trust you will not return to the forest, for you would be in constant danger. And that is not all, in the forest you have no servants, and it is very unpleasant to sleep with dust and filth adhering to your body, and where the flies and mosquitoes are very troublesome.

Brave and noble elephant! Why should you wish to wander free? The forest is full of thorns, bushes, and marshes. Why should you wish to cross the valley and mountains? There you must drink muddy water, and there the stones will cut your feet.

* i.e. physician.—R. C.

IN ART, RELIGION, MAGIC, FOLKLORE

O Father Elephant! We entreat you to banish every wish to stay in the forest. Look at this delightful place, this heavenly city! It abounds in wealth and everything your eyes could wish to see or your heart desire to possess. It is of your own merit that you have come to behold this beautiful city, to enjoy its wealth and to be the favourite guest of His most exalted Majesty the King.[105]

The lamentations attending the death of a white elephant sometimes took the most extravagant form, especially with its royal owner. Anna Leonowens tells how in 1862 a fine specimen was caught and dispatched to the palace of King Rāma IV. The king commanded that a magnificent pavilion should be prepared to receive it, but before the work was completed news was received that the elephant had died. Mrs. Leonowens continues:

No man dared tell the King. But the Kralahome—that man of prompt expedients and unfailing presence of mind—commanded that the preparations should cease instantly, and that the building should vanish with the builders. In the evening his Majesty came forth, as usual, to exult in the glorious work. What was his astonishment to find no vestige of the splendid structure that had been so nearly completed the night before. He turned, bewildered, to his courtiers, to demand an explanation, when suddenly the terrible truth flashed into his mind. With a cry of pain he sank down upon a stone, and gave vent to an hysterical passion of tears; but was presently consoled by one of his children, who, carefully prompted in his part, knelt before him and said: 'Weep not, O my father! The stranger lord may have left us but for a time.'[106]

In spite of the diminishing prestige of the white elephant in recent years the cult was still well alive in the decade following the First World War. In 1926 a white elephant was brought to the court of Siam in a special train equipped with a shower bath and electric fan. Stops of several days were made at way-side stations so that the people in the surrounding villages could come and pay homage to the animal. Processions and theatrical performances took place in its honour, and at each stop it was greeted by a chapter of monks who solemnly intoned its praises. On arrival at Bangkok the elephant was led with much pomp and ceremony to its own special *brah-dī-nān*, or palace, where it was bathed in preparation for the anointing

ceremony. Sacred candles were lighted before an image of the Buddha, and the head Brahman stood by with the great gong of victory. The anointing was performed by the king himself exactly at the auspicious time of twenty-six minutes and twenty-four seconds past nine. This was signalled by a blow on the gong. The king then fed the elephant with red sugar cane, on which was inscribed its name and the titles which were now conferred upon it. Afterwards it was apparelled in garments of state by officials of the Elephant Department, and a golden cord was hung round its neck to show that it had been initiated into the priesthood.

The two great religious systems of India, Hinduism and Buddhism, each had their own interpretation of the white elephant cult. The Buddhists cast the white elephant in the role filled by the dove in Christianity, as is shown by the following beautiful passage from a Buddhist birth story:

Then the future Buddha, who had become a superb white elephant, and was wandering on the Golden Hill, not far from there, descended thence, and ascending the Silver Hill, approached her from the North. Holding in his silvery trunk a white lotus flower, and uttering a far-reaching cry, he entered the golden mansion, and thrice doing obeisance to his mother's couch, he gently struck her right side, and seemed to enter her womb.[107]

The white elephant was specially valued as a rainmaker, and the priests would also watch it for omens by which they could advise on the future actions of the king or his ministers. Every detail of its behaviour was scrutinized and recorded, and a single unusual grunt from the animal would be sufficient to alter the highest policies of state. Usually the advice derived from this source seems to have been good, but this was not always the case, and the English travel writer Samuel Purchas refers to a white elephant which "had been a dismal and disastrous beast to five or six kings".[108] One white elephant that suddenly turned black, and then red, caused the officials in charge of it great consternation (as indeed it might); and another which broke a tusk in fighting a rival led to preparations for a war being discreetly abandoned. Similar superstitions have been recorded about albino African elephants in Abyss-

sinia, but they never evolved into the elaborate systems of belief that were for so long current in the East.

In addition to white elephants animals of normal colour used to play a considerable part in Indian religion and mythology. The elephant-headed god Ganesa has already been referred to, and Indras, the god of the atmosphere, was supposed to ride on a mighty elephant known as Airavata. This animal was believed by the Hindus to be the first elephant in the world. One myth tells how it was the progeny of the heavens, begotten of the agitation of the celestial ocean.[109] Another describes how Brahma sang seven holy melodies over the two halves of an eggshell which he held, one half in each hand. The elephant Airavata emerged from the shell in his right hand followed by seven more males; then eight females emerged from the shell in his left hand. These were supposed to be the ancestors of all the elephants. They also became the caryatids of the universe, four of them supporting the world at the four cardinal points of the compass, the remainder at the intermediate points.[110]

Many other myths concerning the elephant are still current in the East. For instance, the Hindus believe that a single elephant supports the weight of the world; sometimes a tortoise is substituted for the elephant in the myth, and there is thus alleged to be great rivalry between the two animals. Their dispute is settled by the great bird god Garuda who lifts them both up in his claws and carries them to the summit of a mountain.[111] Superstitions concerning elephants grew up alongside the myths, and many of these persisted into quite recent times. The following examples are selected from a single source—the medieval manuscript *Atungé Lakshana*:

The possession of an elephant with a spotted trunk will bring death to the king.

The possession of an elephant with a narrow right cheek will result in the owner having frequent quarrels with his sons.

If the left cheek is narrow then the king will disagree with his ministers.

A dumb elephant will cause a lack of rain.

A deaf elephant will cause loss of wealth and induce fear through enemies.

An elephant with constantly watering eyes will bring sorrow and misfortune to its owner and his family.

An elephant whose testicle area is conspicuous is mean.

An elephant possessing any limb or organ which is out of proportion is unlucky.

An elephant with hair on the head and tail, and a charred looking skin, will result in the destruction of the mahout's house by fire.[112]

Many of these superstitions are now extinct, but others still survive. Thus an elephant with seventeen toe-nails is regarded as extremely unlucky, while one with only sixteen will bring either great misfortune or great prosperity to its owner.[113] In Burma to this day the training of elephants is preceded by a superstitious ritual. A small shrine is set up, offerings are made to the Nats, or spirits of the jungle, and the moment at which training is to begin is decided by the manner in which a number of candles burn out.[114]

A number of Eastern treatments for elephant ailments also have a decidedly superstitious flavour. Thus powdered garlic mixed with ghee, sesame-seed oil, cow's milk and sugar is supposed to fatten a baby elephant, while reducing excessive bile and wind. One elaborate recipe with twenty-three ingredients is regarded as an infallible cure for cancer. A paste made with charcoal, dried fruit, black pepper, mercury, and the juice of the betel nut, is recommended for sore feet. There is also a potion of thirty-three different ingredients, including chillies, ginger, opium, borax, sulphur, saltpetre, and five different kinds of honey. This, it is claimed, will cure diseases of any kind whatsoever, but testimonies from grateful patients, or their mahouts, do not appear to have been collected.[115]

With such extraordinary superstitions current in the East, where the elephant was reasonably well known, it is not surprising that western beliefs concerning the animal reached even greater heights of fantasy. Examples of these are recorded in most of the encyclopædic Latin works compiled by medieval and Renaissance naturalists, and appear in English in the entertaining *Historie of Foure-footed Beastes*, by the parson-naturalist Edward Topsell, published in London in 1607. Topsell devotes over twenty closely printed folio pages to the

elephant, and the result is an impressive mine of inaccurate information. Thus he thought that the Asiatic was larger than the African species, saying: "for which cause, if an African Elephant do but see an Indian, he trembleth, and laboureth by all means to get out of his sight, as being guilty of their owne weaknesse".[116] Again:

It is reported that the blood of an Elephant is the coldest blood in the world, and that Dragons in the scorching heat of Summer, cannot get anything to coole them, except this blood; for which cause they hide themselves in rivers and brooks whether the Elephants come to drinke, and when he putteth downe his trunk they take hold thereof, and instantly in great numbers leap onto his care, which is naked, bare, and without defence: where out they sucke the blood of the Elephant untill he fall downe dead. . . .[117]

Other superstitions of the time are even more curious. For instance, it was believed that elephants were overwhelmingly patriotic, and would shed bitter tears when forced to leave their own country. Like Ferdinand the bull, they were reputedly very fond of flowers; it was even averred that they were often led into the meadows by their keepers, where they would gather flowers in little baskets, and bring them back to decorate their stalls. Chastity was another of their virtues, and Topsell insisted that they took "their veneriall complements . . . never above thrice in all their daies".[118] Where human beings were concerned, however, they were less reticent in their desires, although never coarse and unchivalrous. "At the sight of a beautifull woman," writes Topsell, "they leave off all rage and grow meeke and gentle." He goes on to tell how an elephant in Egypt was once in love with the same woman as Aristophanes, and used to annoy the poet by putting apples into her bosom, and dallying with her breasts. Another elephant loved a Syrian girl, "with whose aspect he was suddainely taken, and in admiration of her face stroked the same with his trunk". It is agreeable to be able to record that the girl reciprocated his affections and made him "amorous devises with Beads and corals, silver and such things as are grateful to these brute beastes". Furthermore, when the girl died, the elephant was

distracted with grief, and in the true romantic tradition, expired at her side.*[119]

The different parts of the elephant, like those of many other animals, were formerly thought to have special virtues as medicaments. For instance, the blood of an elephant mixed with the ashes of a weasel was a remedy for leprosy; powdered ivory taken with Greek honey took away spots on the face; a bad headache would be instantly cured if the forehead was touched with the trunk. Other parts of the elephant body could be used for helping a woman in childbirth, curing rheumatism and sciatica, promoting potency, procuring an abortion, driving gnats or marsh flies out of a house, or curing a chronic cough. This by no means exhausted the list of the animal's virtues; in fact, we cannot but envy our ancestors who, instead of being frustrated by National Insurance cards and queues at hospital clinics, could cure themselves of every imaginable ill by the simple expedient of sending out for an elephant.

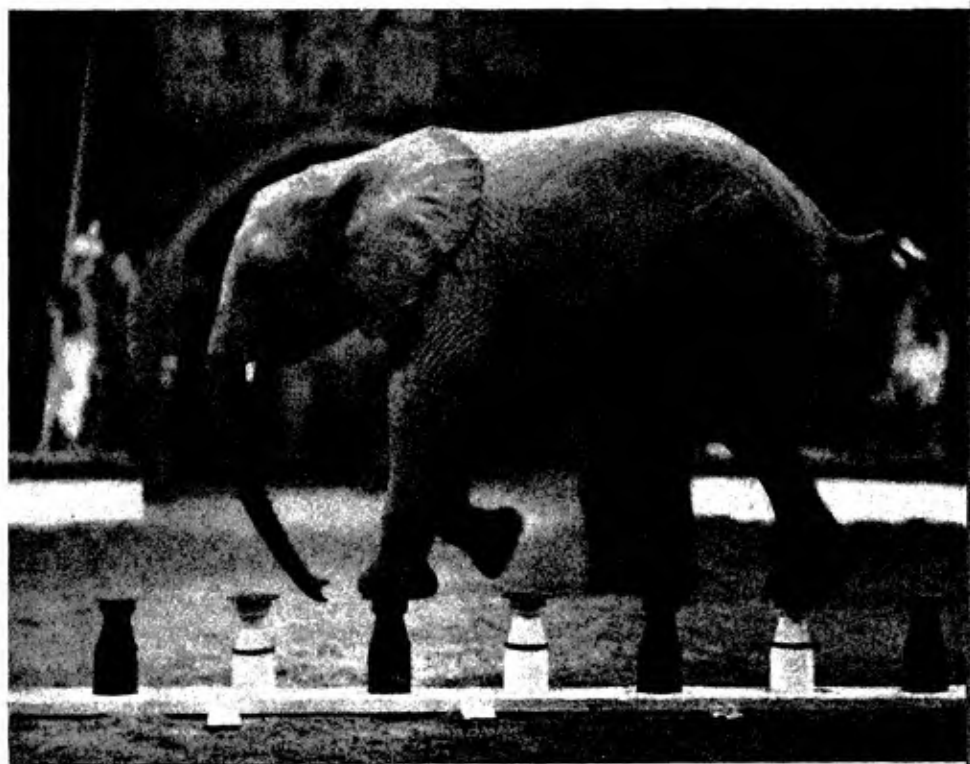
Discoveries of the bones of elephants, mammoths, and mastodons have caused the growth of many legends on both sides of the Atlantic. The bones were seldom recognized for what they were, but were usually regarded as the remains of giants or dragons; tusks were explained away as claws of the gryphon. On the other hand, some of the legends are of scientific importance, for the bones are correctly interpreted as the remains of gigantic animals. For example, a legend current among the Delaware Indians tells how at some distant period in their past a herd of tremendous animals came to Big Bone Lick in Kentucky, where the Indians were then installed. Here they began a universal destruction of the bears, deer, bison, and other creatures inhabiting the region, which the tribesmen regarded as having been specially created for their own use. The god of the Indians was so incensed by this that he determined to liquidate the marauders forthwith. Arming himself with a good supply of thunderbolts, he descended to Earth and took up a strategic position on a mountain-top, which, it is alleged, can

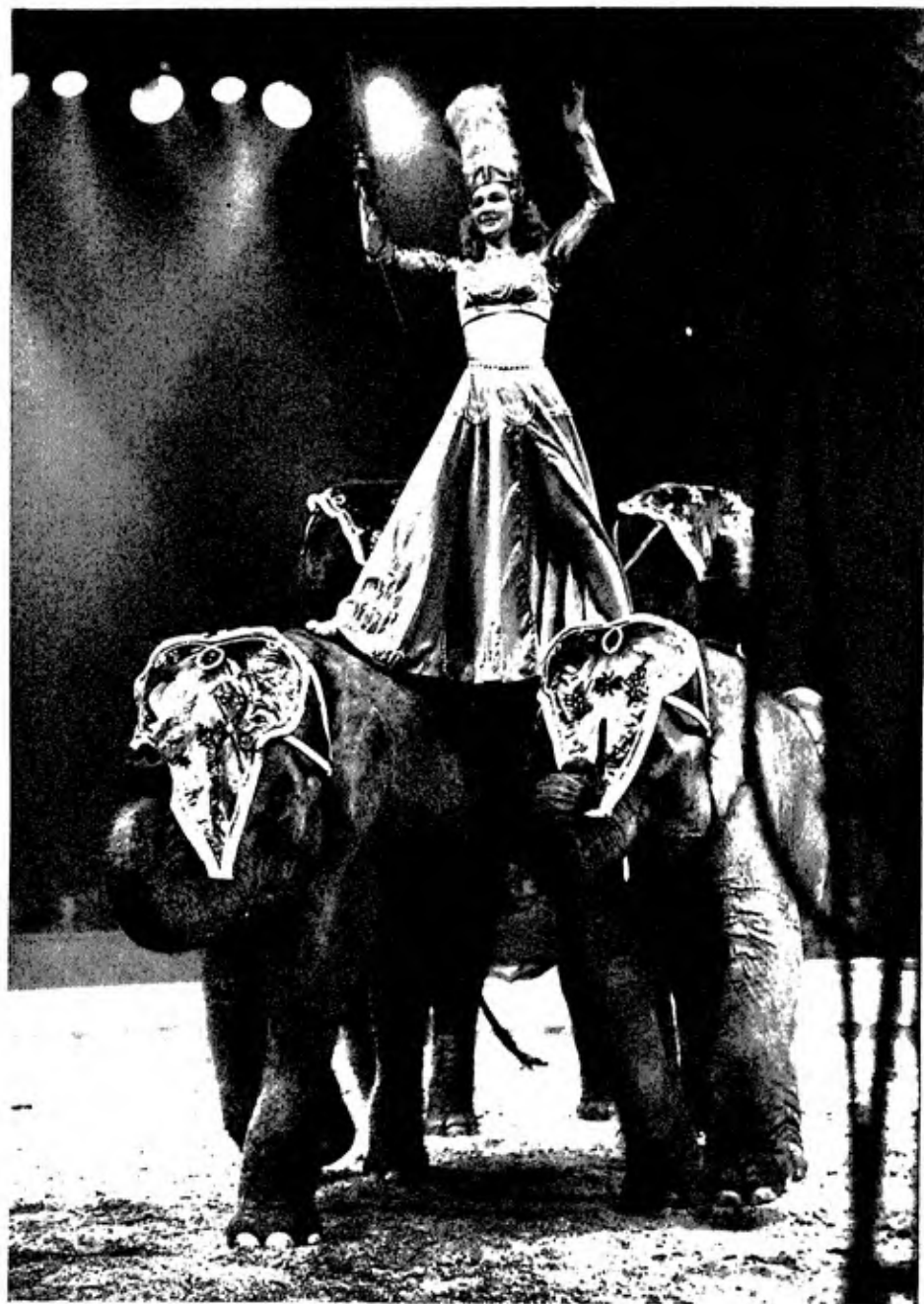
* It is only fair to add that Topsell also recorded many true facts about elephants: he knew, for instance, that they have a twin apex to the heart, that the bulls have abdominal testes, and that the breasts of the female lie just behind the forelegs and not, as is usual in quadrupeds, much further to the rear.



21 a) John Gindl's elephants at Bertram Mills' Circus

b) Young African elephants can also be trained as circus performers





22 Joan Fowles performs a spectacular act in Bertram Mills' Circus

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still be identified by the prints of his feet. When he was well entrenched in his position, the god opened fire with his bolts to such effect that all the invading animals were killed except the leader of the herd. This animal presented his forehead to the shafts and deflected them with great skill to left and right. But at last he missed one, and it struck him in the side, whereupon he bounded immediately away, crossing the Ohio, the Wabash, and the Illinois rivers, each at a single jump, until he reached the land of the great lakes where he is still living to this day. There can be little doubt that, in spite of a somewhat inaccurate conception of their feeding habits and athletic ability, this legend refers to the mastodons whose bones are still found in the region today.

Giant legends based on the bones of proboscideans range from the picturesque to the fraudulent. An example of the former occurs in the works of the sixteenth-century Spanish soldier and historian Pedro de Cieza de Leon, who writes in his chronicles of Peru.

The natives relate the following tradition, which had been received from their ancestors from very remote times. There arrived on the coast, in boats made of reeds, as big as large ships, a party of men of such size that, from the knee downwards, their height was as great as the entire height of an ordinary man, though he might be of good stature. Their limbs were all in proportion to the deformed size of their bodies, and it was a monstrous thing to see their heads, with hair reaching to the shoulders. Their eyes were as large as small plates. They had no beards, and were dressed in the skins of animals, others only in the dress which nature gave them, and they had no women with them. . . . This is what they say concerning these giants, and we believe the account because in this neighbourhood they have found, and still find, enormous bones.[120]

These bones were almost certainly the bones of mastodons, or of one of the other proboscideans now extinct, which continued to exist in South America into Pleistocene and even Holocene times.

Of the fraudulent use of proboscidean bones one of the best examples relates to the remains of *Dinotherium* found near the château of Chaumont, in the Dauphiné of France in 1613. Some

of these bones were paraded through France as the remains of "Teutobochus Rex"—a barbarian leader who had been defeated by the Roman general Caius Marius in the second century B.C. Much money was made by the sponsors of this doubtful exhibition before it was eventually exposed as a fraud.[121] Another remarkable deception was perpetrated by the nineteenth-century fossil collector Dr. Albert Koch. Although in many ways a serious scientist, Koch had a vein of charlatanism running through him which made it quite impossible for him to resist the sensational. When, therefore, he excavated a number of bones from different individual mastodons along the banks of the Missouri river, he had no shame in assembling them into a gigantic composite monster, with the name of *Missourium*, and exhibiting it for the delectation of the public. In 1843 he brought the creature to London, where it was shown at the Egyptian Hall in Piccadilly until Dr. Koch's pockets were sufficiently well lined. Eventually, through the initiative of the great British palæontologist Sir Richard Owen, it was acquired by the British Museum (Natural History) where, remounted and correctly renamed *Mastodon americanus*, it can still be seen.[122]

Numerous elephant legends persist in modern African folklore, while the use of magic in elephant hunting lasted well into the twentieth century and still survives in some regions today. The magical practices have two main objects: the first, to assure a successful outcome to the hunt; the second, to propitiate the spirit of the dead animal, and make sure it will not seek to avenge itself on the hunters. A complicated ritual is often involved, and a single infringement of the accepted procedure is sufficient to render the whole operation fruitless. The subject has been discussed at some length by Albert Jeannin in his *L'Éléphant d'Afrique*[123] so I have here restricted myself to summarizing a few of the more common customs.

One of the best examples of elephant hunting magic is found among the Mindassas of Gabon and the Middle Congo. The ceremonies are conducted by a magician or witch doctor known as the *Njanga djoko*, which literally translated means "master of the elephant rite". This personage, who has great prestige in the tribe and may even be its chief, spends the day before the

hunt in a sacred hut with his wife and a number of ritual objects. These include the bones of former *Njanga djoko*s of the tribe and their wives, and portions of the bodies of particularly large and powerful elephants slain in previous hunts. The spears and guns of the hunters are placed against the walls of the hut, and the *Njanga djoko* makes invocations to the dead so they may assist the operations planned for the following day. A sheep is sacrificed by plunging a spear into its heart, and a number of hens are decapitated and their blood smeared on the bodies of the hunters. When darkness falls the *Njanga djoko* joins the huntsmen in a feast at which the sacrificed animals are eaten. This is followed by a ritual dance, including a kind of symbolic ballet in which a solo performer mimics the heavy tread of the elephant. At length the *Njanga djoko* and his wife retire for the night to the sacred hut, and it is considered auspicious if they have sexual relations there before the hunt begins. (Incidentally, this is quite contrary to practices observed in other parts of Africa, where intercourse is usually strictly forbidden for some days before a major enterprise.) The rank and file of the huntsmen must not, however, indulge on this particular occasion, although they are encouraged to do so as soon as the hunt has been brought to a successful end.

The hunt itself may last several days, for the elephants must first be located and tracked down. As soon as the huntsmen come up with them, the *Njanga djoko* must be the first to fire a shot or throw a spear. If he uses a spear it must be the same one with which he sacrificed the sheep, as this is supposed to give the blow greater effectiveness. Once an elephant has been slain, the first act of the *Njanga djoko* is to cut off its tail. He returns with this to the village, shows it to the rest of the tribe, and summons his wife to where the carcass is lying. He then cuts off the tip of the trunk, from which his wife must suck some of the blood. He next performs the same ritual himself, after which the elephant is decapitated. The meat is then distributed, except for the sexual organs, the liver, the intestines, the trunk and a piece of the heart, which are retained by the *Njanga djoko*. Some of these he eats, and the rest are preserved as ritual objects for use in the next hunt.

The operation ends with a propitiation ceremony. A feast is

held in celebration of the hunters' success, but while the eating and dancing is still in full swing the *Njanga djoko* throws himself at intervals into the midst of the festive crowds and assumes an attitude of profound despair. His voice trembles with emotion as he laments the death of the noble creature; its downfall, he insists, has caused him as much sorrow as if one of his own brothers or sisters had been slain. The object of these lamentations is, of course, to conciliate the spirit of the animal. It is realistically related to the size of the victim, a large bull receiving the most heartfelt expressions of grief, whereas the spirit of a calf or a young cow, which would not in any case be likely to become a serious menace, is dismissed in the most perfunctory way.

Among certain tribes of pygmies elephant hunting magic is further complicated by the fact that the souls of dead chiefs and elders are supposed to take up their abode in the bodies of the animals. Unless one is careful, therefore, one may accidentally kill one of the tribal ancestors, with disastrous consequences. To avoid such untoward incidents requires a good deal of care, and much discussion goes on to decide which animal in a herd may perhaps contain the spirit of a benevolent uncle or aunt. Herd leaders are always avoided, as being almost certainly inhabited by the spirits of chiefs, and other animals are eliminated by reference to certain subtle traits of character and behaviour. One would think this was all very nerve-racking, but with proper discrimination the presence of possessed animals can be turned to good account. Sometimes they will even betray their own kind, leading the hunters to places where unpossessed members of the herd can be easily killed. After a victim has been obtained, the hunt ends with a propitiation ceremony similar to that employed by the Mindassas. Between special dances and other ritual activities a solemn dirge is sung, which may be freely translated as follows:

*Our spears have gone astray,
Oh, father elephant!
We did not desire to see thee slain,
We did not desire to do thee harm,
Oh, father elephant!*

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*It was not the warriors who cut short thy life.
But fate had decreed that thy hour had come.
Therefore return not to trample our huts,
Oh, father elephant!*

African folk tales have always been largely concerned with animals, and the elephant figures in many of them to an extent commensurate with its bulk. But these tales do not often have the quality of similar compositions in other parts of the world, and they often seem rather pointless and inconsequential. Here is an example, collected from near Boromo in Upper Volta by Dr. Jean Cremer:

An elephant was the owner of a fat ram, which he promised to give to anyone who would promise to dig his grave. All but one of the animals of the jungle refused to accept the bargain, saying that the elephant was too big. The exception was the hare, to whom the elephant gave the ram, well pleased that his funeral arrangements had at last been settled. The hare took the ram home, cut its throat and eat it. Some years later the elephant died, and his son went to the hare and said: "Hare, my father is dead. He said that you would come and dig his grave." The hare replied that whoever had said he would do any such thing was a liar. "Where are your witnesses?" he asked. The elephant's son had no witnesses, but he nevertheless called the judge, who questioned both parties to the dispute. When he found that there was no one to confirm what the elephant's son said, he gave the decision to the hare. Which is why, the story concludes, in any difference of opinion it is essential to produce witnesses; otherwise there is no way of establishing the truth.

This is not a very interesting story, nor can it claim to have a particularly startling *dénouement*, but it is a good illustration of the childlike naïvety of the African mind. This naïvety is likewise demonstrated by the many mistaken beliefs held by Africans concerning elephants, and in fact every other kind of game. One would think that people living so close to nature, who until recently derived the great part of their livelihood from hunting, would have acquired a deep knowledge of the animals of the bush. To a certain extent, of course, this is so, but only where

the knowledge is needed for some practical purpose, such as assuring the successful outcome of a hunt. In other questions of natural lore the African native tends to water down his genuine observations with a number of picturesque but entirely erroneous prejudices and superstitions. He is also only too delighted to pander to the European visitor's love of the sensational by telling him a tall story or two.

To conclude this chapter, here is an example of how this trait in the African character can take in even the most responsible of European observers. Writing in *The Sunday Times* of August 18th 1957 Mr. Alan Moorehead tells how an elephant fatally wounded by ivory poachers may sometimes rush off so far into the forest that he dies without the poachers being able to find his body. "Then", he continues, "a most extraordinary thing sometimes happens. The other elephants will descend on the dead beast and tear out its tusks, afterwards shattering them to pieces on the rocks and boulders they happen to find near by." The theory tentatively put forward by Mr. David Sheldrick, the local Game Warden at Tsavo National Park, to explain this behaviour was "that the elephants know that they are being hunted for their tusks, and are determined to deprive their tormentors of their booty". Alas, this charming myth was soon to be exploded, for when I wrote to Sheldrick asking for further details, he admitted that the performance had never been witnessed by a trained African observer, let alone by a responsible European. The behaviour described was, in fact, simply based on tribal gossip, which had led surprisingly to an attractive piece of African folklore being reported as fact in the august columns of *The Sunday Times*. If there is a moral in this story anywhere it seems not unlike that in the tale of the elephant and the hare: "It is essential to produce witnesses; otherwise there is no way of establishing the truth."

CHAPTER FIFTEEN

Elephant Preservation and Control

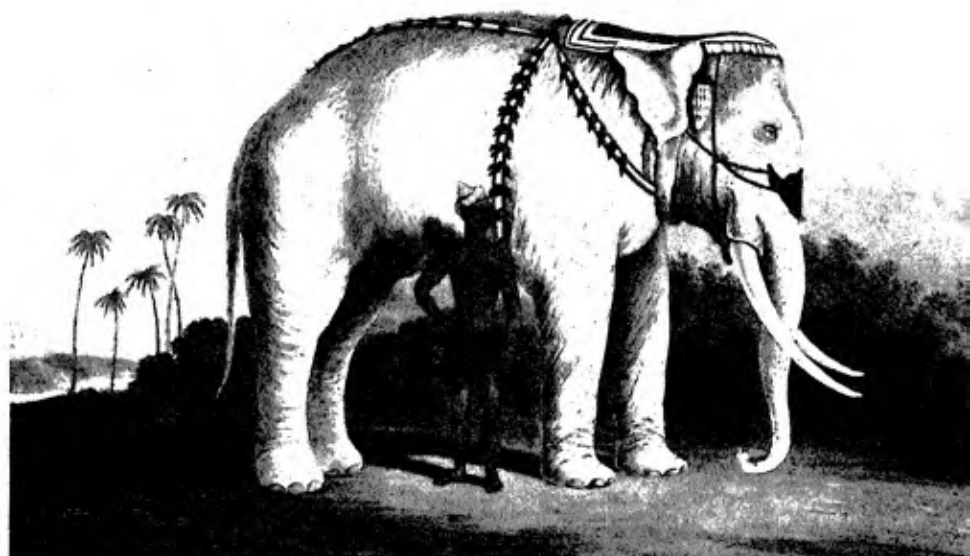
MAN'S ATTITUDE to the preservation and control of elephants has varied greatly throughout the centuries. To our primitive ancestors the only good elephant was a dead one—an attitude which extended to the mammoth and the mastodon as well. But with the growing use of elephants in war they became at least as valuable to man alive as dead, and laws were introduced for their protection. At the same time a growing interest in hunting for sport led to certain areas being set aside as hunting grounds for the king and high officials of the court. Here, by the same paradox that makes sportsmen today the best protectors of the fox and the pheasant, the elephant enjoyed a freedom from persecution which would not otherwise have fallen to its lot. In the East its role as a peaceful servant of man, and its prestige as a quasi-religious symbol, were additional factors encouraging its preservation.

But, as we have seen, the military value of the elephant waned, mainly through the reluctance of the Romans to use it in their armies, and the animal was once again exposed to the dangers of direct competition with man. It was slaughtered as a spectacle in the arena, and indiscriminately hunted by the Roman settlers in North Africa both for sport and material gain. Later, as the demand for ivory increased, the animal became a profitable quarry in every region to which European explorers had penetrated. It was soon exterminated in Africa north of the Sahara, and serious inroads began to be made in its numbers in the more southerly part of its range. With the introduction of firearms to Africa, and their growing use by native ivory hunters, the process was greatly speeded up, and serious fears began to be entertained for the animal's survival. In the East the process was less drastic, but was still extremely

disturbing. The decline of the elephant's religious significance, the waning power and wealth of the native princes, and the introduction of western machinery to do the work previously performed by elephants, all led to a reduction in the animal's usefulness, and therefore in the need for giving it protection.

It is a surprising and encouraging fact that in spite of these dangers elephants today are in no danger of extermination. This is due largely to a new attitude to the commercial exploitation of wild animals which was gradually evolving during the closing years of the nineteenth century. At this time a few enlightened colonial administrators began to see that action must be taken quickly if the elephant, as well as many other wild animals, was to be saved as part of the human heritage. They began a campaign in Parliament and in the Press to encourage measures of control over hunting, both by natives and Europeans, in the areas which they administered. These measures were often extremely unpopular locally, for they struck at the financial self-interest of almost everyone concerned; but they received the support of European public opinion, and as a result game laws were introduced in many African and eastern territories.

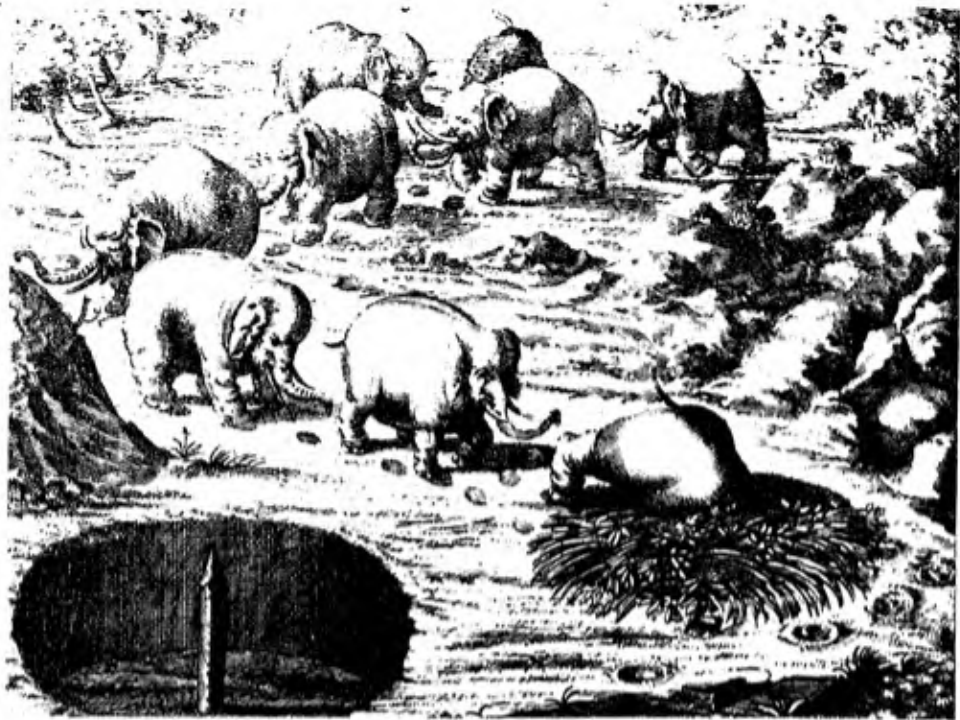
It would be tedious to catalogue here the stages by which this legislation was gradually modified until it became as effective as it is today, but a brief word must be said about the way it now works. The game in a particular area is usually assigned to one of three categories. Animals in the first category must not be killed in any circumstances at any time; those in the second may only be hunted under a special licence provided by the local Game Department specifying the numbers which may be killed during a given period; those in the third are classified as vermin, and may be hunted without any special formality or control. The cost of the licences, and the number of animals allowed on each, is varied from time to time according to the fluctuations of the animal population; for similar reasons animals may occasionally be transferred from one category to another. In general the system works very well, not only providing protection for the game, but a source of revenue for the government from the not inconsiderable fees charged for the licences.



23 a) White elephant seen by John Crawford on his embassy to the court of Ava. From Crawford (1829)

b) A seventeenth-century artist's impression of elephants laying waste a forest. From Ludolphus (1681)





24 Two early eighteenth-century book illustrations from Kolb (1719):

a) Hunting elephants by means of pitfalls

b) Hottentots hunting elephants and other animals with spears and bows and arrows



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The elephant is usually placed in the second category, and each licence will probably allow for the shooting of only one specimen. To shoot a second elephant the hunter must obtain a second licence, and this will often be at a higher rate than the first. A licence for the first elephant usually costs about £75, for the second about £100. Apart from the number of animals allowed by the licence, certain additional restrictions are normally imposed. Thus in most territories the shooting of cow elephants accompanied by calves is forbidden in all circumstances, and the tusks of a bull must exceed a certain weight or the ivory is confiscated by the government.

Apart from the issue of licences for hunting with firearms, much legislation has been introduced to abolish the cruel hunting methods formerly practised by African natives. Thus hunting by pitfalls, weighted spears slung from trees, ringing with fire, hamstringing, and several of the other methods described in Chapter Eleven, has now been made illegal in British African territories. Similar laws have been passed by the Belgians in the Congo and the French in the vast regions of Africa still under their control. This is not to say, of course, that the practices do not continue to a considerable extent under cover; but they are much reduced, and it is now a rarity to come across one of the pit traps so frequently mentioned by early African explorers. Some of these have actually been voluntarily filled in by the hunting tribes, and as anyone will recognize who knows the African passion for almost any occupation other than physical labour, this represents progress indeed.

Another factor that has helped in the preservation of the elephant has been the establishment throughout all the game areas of Africa of a great network of national parks. In these parks all animals are completely protected, and where possible the native population is moved to adjacent areas. In the Murchison Falls National Park in Uganda, the Tsavo National Park in Kenya, and many others, it is still possible to see vast numbers of elephants in a completely natural state. The national parks are already the most important method of wild life protection in Africa and, as the rapid opening up of the continent proceeds, they will eventually become the animals' only strongholds. For this reason it is particularly important

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that, as more and more African territories achieve self-government, guarantees should be sought that the national parks will remain for ever inviolate. As no guarantee is permanently effective unless willingly given, the future of the national parks will ultimately depend on the degree to which the African can be educated in the principles of conservation before Europeans lose too much of their influence in the administration.

So far the game laws and the establishment of the national parks have been so successful in halting the destruction of the African elephant that for many years its numbers have actually been on the increase. This is good news to all lovers of the animal, but it has inevitably brought problems in its train. The increase in the numbers of African elephants has coincided with an expansion of cultivated land in the continent. Now, there is not an elephant living who will not sell his soul for sugar-cane or the juice of plantain stems if he can lay his trunk on these delicacies, and as a result the incidence of elephant raiding on the *shambas*, or native gardens, was very much increased when the first game laws began to take effect. District Officers were perpetually being confronted by African cultivators who had surprised a herd of elephants in their plantations cheerfully tucking the pick of the crop into their capacious stomachs. The fruits of many months of labour were often destroyed in a single night by such marauders, and it became obvious that steps must be taken to protect human interests. The result was the initiation of the elaborate system of elephant control which today has achieved almost complete success in keeping the elephant within bounds.

The history of elephant control in Africa goes back to the beginning of the century, when European hunters were encouraged to destroy raiders by being allowed to keep one of each pair of tusks of any animal they shot. This scheme was obviously open to abuse, for if a large tusker was sighted few hunters were sufficiently scrupulous to enquire whether it was a raider or not before placing a ball in its brain. Accordingly this scheme was discontinued, and in 1912 rifles were issued to the natives themselves. The optimist who first encouraged this practice was soon disillusioned; the natives quickly became trigger-happy, and a large number of elephants escaped wounded, becoming even

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more vicious and troublesome than before. The next scheme, started in Tanganyika Territory about 1923, was to give a limited number of Europeans free licences to shoot twenty-five elephants, provided they reported the kills to the local District Officer, and only hunted where elephants were known to be doing damage. Another failure could have been predicted by anyone who knew human nature. Among the selected individuals the less scrupulous immediately went to the finest elephant country, usually many miles from cultivation, and bagged twenty-five large tuskers whether they were guilty of raiding crops or not. This, of course, had a precisely opposite effect to what had been intended. Elephants formerly innocent of raiding retreated from the wilds to the fringes of the plantations, where they found a bountiful table spread as if in their honour, without a single elephant hunter to hinder their enjoyment of the feast.

It became obvious at last even to the most innocent colonial administrator that the element of self-interest must be removed if elephant control was to become properly effective. As a result it was decided to employ official salaried hunters who would have no pecuniary interest in the numbers or size of the animals shot. This guaranteed that only sufficient animals in a herd would be killed to discourage further raiding; the ivory became the property of the Government. These hunters were officially known as Cultivation Protectors, and they were empowered to shoot any dangerous game, such as lion, rhinoceros, buffalo and hippopotamus, as well as elephant, which might be invading cultivated land. They also had standing orders to destroy animals such as bush-pig and baboon, which count as vermin in Africa and do immense damage to crops.

The Elephant Control Scheme is still working satisfactorily in Africa today. The number of animals killed each year is recorded in the Annual Reports of the Game Departments, and is often astonishingly large. Thus in Tanganyika alone in 1955 no fewer than 1,900 elephants were shot by officials of the Game Department in the course of cultivation protection, and in 1956 the figure had risen to 2,137 (*Tanganyika: Annual Report of the Game Department, 1955-6*). This was, of course, in addition to several hundred tuskers killed under special licence by private

shooting parties, and a considerable amount of ivory poaching. When one remembers that the elephant breeds only about once every three years, and normally produces only one calf at a time, the death roll may seem disproportionately high. However, the Game Wardens on the spot, who are the men best qualified to judge, are convinced that the elephant population is continuing to increase, and in some areas is only with difficulty being kept within bounds. In undeveloped regions, where cultivation protection is not yet of special importance, the elephant is increasing at the rate of many hundreds a year. Thus in the southern Sudan the estimated elephant population is believed to be between 15,000 and 20,000, of which about three-quarters are cows. It is only necessary to kill about 300 elephants a year for crop protection, and the total annual mortality is somewhere in the region of 1,000. No effort of higher mathematics is required to see that even if only a third of the cows are regarded as breeding animals (a very conservative estimate) the number of Sudan elephants is still increasing at the rate of several hundred a year.[124] In Tanganyika the estimated population is even higher—some 80,000, according to a recent Game Department estimate.[125] Comparative figures for Kenya, Uganda and the Congo are 6,000, 11,000, and 100,000 respectively,[126] and in each territory a steady increase seems to be taking place. If we include the population of the French colonies and of the vast tracts of land between Tanganyika and the Union of South Africa, the total number of elephants in Africa must be well over a quarter of a million, and probably considerably more.

The chief danger that might reverse the encouraging trend revealed by these figures lies in ivory poaching. In some areas this has reached alarming proportions. For instance, *The Times* for October 31st 1957 (p. 9) reported the Director of the Royal National Parks of Kenya as saying that more than 3,000 elephants had been killed in one game area alone during the previous two years. An anti-poaching control party patrolling an area 25 miles long by 20 miles wide between the Galana and Tana rivers had counted more than 1,280 elephant carcasses in a period of nine weeks. But fortunately the activities of poachers are now gradually being brought under control, and provided

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a continuous check is kept on the fluctuations of the population there is little danger that the African elephant will ever be exterminated by man.

Turning from Africa to the East we find that the position is somewhat different. Most areas of Asia occupied by elephants have enjoyed a long period of civilization and, as we have seen, captive elephants have played an important role as domesticated animals. The value of the elephant has therefore been generally recognized by the native princes, and some of the laws introduced for its protection date back for 2,000 years.[127] On the other hand, the cultivated land has encroached to a far greater extent on the jungle than in Africa, and in consequence the wild elephant population is smaller and largely restricted to certain defined areas. Even in Burma, which contains some of the remotest and most unspoiled elephant country in the East, the wild elephant population is probably only about 10,000. [128] In a widely cultivated land like Ceylon it is much less, and the elephants have to be strictly controlled to prevent widespread damage to plantations. In Sumatra, for the same reasons, much indiscriminate slaughter has gone on, and the Sumatran elephant may soon be in serious danger of extermination.

In general, however, the position is fairly encouraging. National parks exist in many parts of the East, and the influence of the various nature conservation societies is having a continuous and cumulative effect on public opinion. Given a chance, the Asiatic elephant will multiply as quickly as his African cousin; in fact, recent reports from Assam suggest that the wild elephant is strongly holding its own, and tends to increase as soon as control methods are relaxed.[129]

To sum up, the present flourishing condition of the elephant in most parts of its two continental homelands, and particularly in Africa, is a cause of great encouragement to all those who have known and lived with the animal, and fought on its behalf against the callousness and greed which at one time seemed to threaten its existence. This is not, of course, to say that the battle has yet been fully won, for its position in Ceylon, Malaya, and especially in Sumatra is by no means secure. Yet in the past fifty years there does seem to have been a growing

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recognition of the fact that the wild life of the Earth has not been placed there to be squandered for the personal gain of individual men; it is part of our universal heritage which we have a moral responsibility to protect.

It would be foolish to suggest that enlightened self-interest (to use a popular modern phrase) has not played a part in shaping this attitude, for elephants and other big game are now generally recognized as a source of tourist revenue in every country fortunate enough to possess them. But I believe that our growing sympathy with the principles of wild life conservation is based on something more than this. The evolution of the human consciousness is gradually leading to a greater understanding of certain fundamental truths. One of these is that a compassionate interest in the welfare of animals less advanced in the evolutionary scale than ourselves is an essential component in the character of the truly civilized man. This view can no longer be dismissed as a sentimental indulgence; it is accepted by all thinking people as a simple and unassailable criterion of spiritual maturity. The elephant has played a large part in bringing this new attitude into being. It has become for us a symbol of the wonder and beauty of the natural world, and its long history recalls to our imagination those epochs, infinitely remote and mysterious, when our own destiny was still unsure. If we can continue to be moved by this simple poetic idea, then the future not only of the elephant itself, but of its humbler and less spectacular comrades in the procession of life, will at last be assured.

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